

AN HISTORIOGRAPHY OF PALATAL PROSTHESIS

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VOLUME I

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Appendix. Concepts of Soft Palate Prosthesis.

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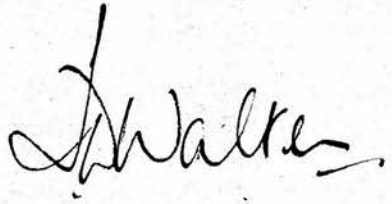
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DECLARATION

I declare that this thesis, presented for the degree of Doctor of Dental Surgery at the University of Edinburgh has not been submitted for any other degree, diploma or professional qualification. Further, that the necessary research work and composition of the thesis has been carried out entirely by myself and that the only material previously published by me on this topic is represented in the appendix.

A handwritten signature in cursive script, appearing to read 'J. Walker', is centered on the page.

LAYOUT AND CONVENTIONS

The thesis is divided into seven chapters. The sections and sub-sections of each chapter are numbered by an expanding decimal system. Illustrations, referred to by figure numbers in the principal text (volume I), are bound in a companion volume (II) for parallel reference.

General referencing accords with the conventions laid down by the Journal of the History of Medicine, with two exceptions:

- i. Journal titles are abbreviated according to the principles indicated by "World Medical Periodicals" 3rd edition and supplement (World Medical Association, London and New York, 1961, 1968).
- ii. Author's initials are placed after the surname.

References are to be found at the end of chapters or, where these are long, at the end of major sections. Reference pages are colour-coded to aid location. A list of bibliographies and indices consulted appears at the close of volume I.

DEFINITIONS

Artificial velum	A specific form of prosthesis restoring open ended defects of the soft palate and designed to be under the muscular control of the soft palate.
Caoutchouc	Gum elastic : used by some writers to denote soft vulcanised rubber.
Nasopharyngeal seal	The separation of the nasopharynx from the oropharynx, necessary in swallowing and the formation of certain speech sounds.
Obturator	A covering, bulb or simple bung occluding a palatal defect.
Palatal prosthesis	Any form of appliance making good a defect of hard and/or soft palates.
Staphylorrhaphy	The operation of suturing the soft palate.
Uranoplasty	The surgical repair of the vault of the palate.

Velar	Pertaining to the soft palate.
Velar rubber	Soft vulcanised rubber.
Velopharyngeal seal	A mechanism of achieving naso-pharyngeal seal(q.v.) in which the soft palate, or its artificial replacement, is in contact with the posterior wall of the pharynx.
Velum (a)	Soft palate(s).

ABSTRACT

Previous accounts of the history of palatal prosthesis are reviewed and demonstrated to be of limited scope. In many instances, these accounts were also inaccurate.

The bibliography of sixteenth and seventeenth century references to palatal prosthesis is discussed and translations are given from original texts. Wherever possible, the influence of an author upon subsequent writers is traced.

With the establishment of dentistry as a calling in its own right, the development of palatal prosthesis regained momentum in the eighteenth century. The influence of the French chirurgien-dentistes is emphasised during this phase and the persistence is demonstrated of some of their concepts to more recent times.

Four classes of appliances devised for the prosthetic rehabilitation of the soft palate receive consideration in a separate chapter. The concepts behind these forms of design are also discussed. Finally, methods of combined surgical and prosthetic treatment are classified and presented.

The emphasis of this text is upon the literature published before 1850, which is not widely available. Broad lines of development are investigated in later literature, but it is the foremost object of the thesis to trace the establishment of principles in the design of palatal prosthesis.

CHAPTER I

REVIEW OF LITERATURE

1 REVIEW OF THE LITERATURE

1.1 Classification of the Literature

The literature relating to the history and development of the palatal obturator and artificial velum may be categorised under four principal headings.

- i Historical Notes. These were frequently derived from borrowed sources but some embraced original findings and comment. Such notes were regularly employed to demonstrate that all related history culminated in the appliance which the author concerned was about to describe. Alternatively, the notes comprised an introduction to material of the second or third category.
- ii Surveys of appliance design contemporary with the reviewing authors.
- iii Accounts of the life and work of individual figures who had prescribed the use of the obturator.
- iv Definitive studies relating solely to the history and development of the appliances.

Discussion forming a review of previous literature might properly be limited to contributions of the fourth category, the direct predecessors of the present study. Such a review would be confined. It was found that, in certain instances, writers of definitive histories had placed undue and uncritical reliance on the fragmentary notes of earlier authors. In order to demonstrate how errors arose and were perpetuated in the literature, it is necessary to include in the discussion those historical

notes comprising the first category.

Literature of the second category, when written, amounted to contemporary clinical comment. The earlier accounts now provide interesting historical evidence, although this was not the intention of the authors. These accounts are referred to in the sections of this study appropriate to the various periods. Similarly, mention of the more detailed contributions concerned with one figure (the third category) is reserved for later sections.

1.2 The earliest account of the development of the palatal obturator which was consulted was that by CULLERIER (1804)¹. The account was later reproduced in substantially the same form (1819)². He pointed out that there was no mention of palatal obturators by the medical writers of the 12th, 13th or 14th centuries: in fact it was some time after the introduction of syphilis, with its consequent lesion of palatal perforation, that the first accounts of the obturator began to appear.

The earliest reference to palatal obturation was that by Petronius: the date was given as 1565, but Cullerier was not convinced that the obturator was unknown before Petronius writings. Subsequent authors quoted by Cullerier were Paré (1575), Scultet, Garengéot (1715) and Heister. All these writers had advised the use of sponge obturators, the disadvantages of which were detailed by the reviewer. The major section of Cullerier's contribution was devoted to contemporary French mechanical obturators (see figure 1); this was

linked to the historical review by mention of Fauchard and the establishment of his design principles in 1728.

1.3 GARIOT (1804)³ had been present that year at a lecture given by Cullerier to the Société de Médecine. This lecture provided the substance of Cullerier's publication and also the basis of Gariot's account. Gariot introduced a five category classification of obturators, indicating historical aspects in relevant categories. Clear distinction was made between bec de lièvre (congenital cleft) and acquired palatal defects.

1.4 de la BARRE⁴, writing in 1820, mentioned historical references similar to Cullerier's. Gariot's example was followed in classifying the obturators; the first category, dealing with sponge obturators, was of particular relevance. In addition to those author's cited by Cullerier, de la Barre included Fabrice de Hildan and Guillemeau, (his authority that the palatal obturator was known to the ancient Greeks).

1.5 SNELL presented the earliest historical review of the palatal obturator in the English language; there were two editions of his work⁵. The account given in 1824 closely resembled Cullerier's, but Snell added mention of writers whom he had found listed in Haller's bibliography. By 1828, when the second edition of Snell's work was published, the author had consulted those references he derived from Cullerier and as a result, his discussion was extended. Snell had also undertaken a survey of the earlier work by such authors as Albucasis and Avicennae but had found no mention of the palatal

obturator until the sixteenth century. The second edition of Snell's work also betrayed the influence of de la Barre's views on the history of the obturator; there was for example a literal, but not very meaningful, translation of de la Barre's comment on Scultetus.

Combining the findings of Cullerier and de la Barre with the results of his own researches, Snell's final account cited a number of sixteenth century writers. The earliest of these was Hollerius (1552), but from the inaccuracy of the reference it seemed that Snell's knowledge of this text was indirect. More detailed reference was given to the works of Petronius (1565), Paré (1579), Fabricus Hildanus (1596), Guillemeau (1649) and Amatus Lusitanus (1653). Other early authors to be quoted were Tulpius (1685), Garengot (1715), Fabricii Hieronimi (1723), Wiseman (1734), Heister (1737) and Astruc (1754). Muys, Solingen and Callisen were mentioned without quotation or dates.

Whilst Snell's contribution was of considerable value in drawing attention to these authors, he seldom made reference to the first editions of the respective works. For example, Amatus Lusitanus, quoted as 1653, in fact first published his case history of the palatal obturator 93 years previously. A totally false historical perspective was thus created by Snell which, if adhered to, would render it impossible to find any meaningful inter-relation in the works of the cited authors. As will be shown, all too many modern English-writing historians following Snell embraced his writing

uncritically and without further investigation.

Snell also gave a comprehensive account of the obturators designed by the French surgeon-dentists. These included Fauchard, Bourdet, de Chemant and de la Barre together with lesser known work, details of which had been preserved by Cullerier and de la Barre. Regrettably, there was little which Snell could relate concerning the endeavours of his contemporary English colleagues. The two designs by the instrument manufacturer, Weiss, unsophisticated by comparison with French appliances, received attention. Alcock was derided for his time consuming method of preparing an artificial palate which he cast rather than struck.

The problem of succeeding authors placing undue reliance upon Snell is manifest not only in faulty references, but in the confusion arising from a lack of classification. Snell termed all palatal appliances obturateur whether they were of a simple sponge construction for circumscribed lesions of the hard palate or more complicated designs for congenital lesions of the soft palate. Snell's contribution borrowed from de la Barre in other respects, it was to be regretted that Snell could see no value in classification.

1.6 The influence of the three earlier French reviews was soon manifest in the writings of others. LAGNEAU (1826)⁶, in a brief historical survey mentioned the names of Petronius, Paré, Garengéot, Heister, Fauchard (1728) and Bourdet. No name, apart from Fauchard, was given a date and the contribution was unillustrated.

1.7 MAURY (1828)⁷ modelled his review of obturators on that of de la Barre. In Maury's view surgery was indicated for congenital palatal lesions and therefore obturators were limited to acquired defects. Maury's classification of the appliances was essentially that of de la Barre, though compacted into a smaller number of categories.

1.8 KOECKER⁸, in the 1835 edition of his essay, did not review the historical aspect of the obturator but depicted the various patterns of contemporary French obturators collected by de la Barre. This contribution was well annotated and referenced. The only other description in English of these obturators had been by Snell and this was unillustrated. The copy of Maury's work in the Royal Society of Medicine collection was of note as it was signed in presentation by the author to Koecker (figure 2).

1.9 le FOULON (1841)⁹ gave an account which was influenced entirely by de la Barre's presentation. The classification of appliances was identical in both cases and le Foulon repeated de la Barre's error in stating that the ancient Greeks knew of the obturator - a device which they termed Hyperoe. This contention is discussed later in the present work¹⁰.

1.10 SCHANGE¹¹ in a third edition of 1842, confined his attention to the obturators developed by Frenchmen: the exception was a mention of Petronius (1565). Consideration of Paré (1595), Fauchard, Bourdet and de la Barre led to the surveys by Lagneau and Cullerier and

contributions by contemporaries of the author.

1.11 ROGERS¹² in a second edition of 1847 provided a superficial historical note on obturators. He made a number of errors in dates and titles of works referred to, but indicated the influence of Cullerier by mentioning Petronius' contribution of 1565.

1.12 SERCOMBE (1857)¹³ presented a paper to the Odontological Society of London which dealt with the surgical and mechanical treatment of cleft palate. The development of surgical treatment was traced in greater detail, Sercombe attributing the first surgical procedure to a French dentist, le Mounier "about the year 1760".

Although warm reference was made to the second edition of Snell's book, it was noticeable that Sercombe made no attempt to copy details from Snell's history. This was not to infer that Sercombe introduced new figures into the account of the development of the palatal obturator, or that he corrected Snell's errors in publication dates. It was the author's intent to mention only a few of the more prominent contributions and, in doing so, he contrived a unique historical distortion. By adhering to the English translations of the works by Guillemeau (1598) and a late edition of Paré (1665), Sercombe missed the point that Guillemeau's device was a copy of Paré's second instrument. The similarity between the two was not remarked upon.

Sercombe's account then passed to the eighteenth century with a quotation and illustrations from Heister's work (English translation, 1757). Mention was made of

Fauchard's obturators: in the text a date of 1786 was given, but the engraver who copied the plates derived his illustrations from the first edition of Fauchard's treatise (1728). Following brief mention of appliances designed by Bourdet and de la Barre (without reference to the latter's historical account), Sercombe concluded with a description of Stearn's artificial velum, derived from the Lancet (1845). Sercombe was not aware that Stearns was an American and described him as a London surgeon.

1.13 RAMSAY and COLES (1868)¹⁴ rendered an account of the appliances used for remedying accidental and congenital clefts "from AD 1552 to the present time". The earlier part of this account was an almost verbatim repetition of Snell's - as the opening date of 1552 might suggest. The post-Snell era included reference to Stearn's description of his artificial velum (1845) and the attention paid to this device by the 8th edition of Harris' textbook. Ramsay and Coles brought the account up-to-date with details of the contributions made by Sercombe (1857), Kingsley (1864), Ramsay (1865) and Parkinson (1867): these latter appliances were all devised for congenital lesions of the soft palate. Mention was also made of Suersen and his hard rubber obturator. No attempt was made to explain the differing theory behind the use of the Suersen appliance and the moveable velum type, which the authors had concentrated upon.

1.14 GAUJOT and SPILLMAN (1872)¹⁵ were other authors who presented contemporary developments in palatal obturators. Their contribution provided a resumé of concepts between

1840 and 1870, without differentiating the presentation between obturators suitable for congenital defects and those suitable for acquired defects.

Having committed themselves to the statement that Paré, at a date unspecified, was the first to introduce the palatal obturator, Gaujot and Spillman paused only for a brief mention of Fauchard. There was then a description of how Fauchard's concept of the winged obturator had been modernised by Charrière, an eminent surgical prosthetist of their own time. The authors, however, preferred a rubber stud obturator, which they erroneously attributed to Larrey, but which was developed by Gariel (1852)¹⁶.

Gaujot and Spillman stated that until the 19th century, palatine prosthesis was restricted to bony perforations and that only in their time was it contrived to attempt prosthetic restoration of acquired or congenital defects in the soft palate. This contention was incorrect. It would have been more accurate to state that only circumscribed perforations of the palate had been repaired by prosthetic means prior to the 19th century and that the treatment of congenital lesions of the soft palate was a new departure. One of the earliest attempts at the provision of an artificial soft palate, according to the authors, was that by Nasmyth. No record could be found of Nasmyth's description of his appliance, and it was concluded that Gaujot and Spillman derived their information from Stearn's writing of 1845¹⁷. Considerable attention was paid to Stearn's artificial velum whilst the

essentials of other important American prostheses by Hullihen, Blandy and Kingsley were discussed.

1.15 The first of the American writers to trace the development of the palatal obturator was KINGSLEY (1877-8)¹⁸.

He was writing at a time when adequate referencing was a nicety rather than an essential feature of a paper. Thus it cannot be hazarded as to where Kingsley derived the information that Petronius was first to give a description of an obturator, a few years before Paré (1541). Kingsley mentioned Heister (1756) to illustrate the duration of recommendation for sponge obturators; meanwhile Fauchard (1728) had described "a more complicated mechanism" which was improved upon by Bourdet (1756). Mention was made of de la Barre (1820) and Snell (1828), the author continuing to a consideration of American authors of his own time. These included Rowell (1841) and Hullihen, whose instrument was described in great detail, only to be condemned.

Despite the mild arrogance of his style, Kingsley's contribution possessed two outstanding features. Firstly, he made a clear differentiation between obturators and artificial vela. Secondly, although his interpretation may be open to criticism, there was an attempt to measure the various designs of artificial vela against physiological criteria.

1.16 CHRIST (1901)¹⁹ made an important contribution in presenting his historical data. Some items of this data were questionable - the contention that cleft palate surgery dated from 1824 for example. There was an attempt

to explain why palatal prosthesis received no apparent mention in surgical literature, before syphilis spread through Europe at the end of the fifteenth century. In Christ's view the treatment of congenital lesions represented too great a technical demand, coupled with this, diseases and weapons of war would not inflict perforations of the palate in isolation of other mortal lesions and thus obturators would not be called for.

Christ described Paré's obturators (1561) in detail and closely argued the precedence of Amatus Lusitanus (1560) in this field. Christ's views on Paré's supposed claim to have originated the obturator, after becoming aware of Amatus' writings, are discussed later in this work²⁰.

Brugger had been a further author to consider Petronius the first to describe obturators. Christ had investigated these claims and pronounced that his researches indicated that Petronius could not have published on the topic before 1567. There was an extensive quotation from Fallopio (1564), leading to a reasoned discussion of Guillemeau's contentious statement concerning the use of the obturator by the Greeks. The statement had been an inoffensive, though perhaps poorly punctuated, note concerning the Greek for "palate". Christ did much to explain this misunderstanding²¹. Unfortunately his comments were largely unheeded by more recent histories of palatal prosthesis.

Although some of Christ's statements were to be challenged, the stature and originality of his contribution

set new standards in the literature of the topic.

1.17 With interest shifting towards the restoration of soft palate function GRUNERT (1904)²² presented the style of historical introduction to palatal prosthesis which was to become generally adopted in the textbooks of the first two decades of this century. This pattern was a brief mention of the early sponge obturators (Petronius, Paré, Guillemeau and Heister); on to Fauchard (1727) and the dawn of the mechanical obturator, followed by Bourdet's concept (1796) that palatal perforations should be covered, without introduction of the obturator into the defect. The path was then traced of the real prosthetic conquest - that of the congenital cleft. Grunert first mentioned Jourdain (1784) in connection with prosthesis for the congenital defect; he was followed by de la Barre (1820), Snell (1823), Stearns (1842) and Kingsley. Suersen's concept was described in detail with references for supporting comment on the muscular activity of the nasopharynx. The account was brought up-to-date by consideration of techniques combining prosthesis and surgery.

1.18 One of the features of GUÉRINI's work on the history of dentistry (1909)²³ was his survey of dental techniques which he culled from surgical works written before the advent of dental literature in its own right. The palatal obturator received scant attention, but Guérini did mention the contribution of Fabrizio (Fabricus of Aquapendente) in this context. The publication date of 1723 represented a very late edition however.

1.19 MARTINIER and LEMERLE (1915)²⁴ wrote a war-time

volume on prosthetic maxillo-facial restoration. The inaccuracies in the historical notes were manifold, but there was a classification of palatal prosthesis into those for the hard palate and those for the soft palate, or velum.

Cullerier's time honoured dictum concerning the writings of Petronius in 1565 was reproduced as the first obturator for the hard palate. There was, however, no mention of de la Barre or Snell as originators of an appliance for the soft palate; the attribution was given to Schange (1841) who was a late entry in the field. Mention of other figures was confined to those whose techniques were still in current use, for example, Kingsley (there was an incorrect attribution of a figure to Kingsley), Suersen, Delair (1902) and Case (1905). Martinier's own rather ponderous and impractical designs were also described.

A subsequent section of Martinier and Lemerle's work dealt with the concept, introduced towards the end of the nineteenth century, of combining surgery with prosthesis for palatal repair. In this context, the names of Schiltsky, Krouschoff and Brugger were mentioned. Details for construction of the Schiltsky and Brugger obturators had been given in detail by Grunert.

1.20 L. and C. RUPPE (1927)²⁵ were concerned only with the history and development of appliances for the prosthetic restoration of the congenitally cleft soft palate. They sub-divided these appliances into the following categories:-

- i Artificial vela, appliances attempting anatomical replacement.

- ii Ball obturators, fixed appliances placed between the palatal remnants.
- iii Massage appliances for use after staphylorrhaphy.
- iv Obturators used in conjunction with surgery.

The first category included those names mentioned by previous writers in the same context and which, by now, provided familiar reading.

Just as the historical account of the artificial velum culminated in the Ruppes' design, so it was with the ball obturator (balle obturatrice). Gion's design of 1865 had been the first obturator of this type, but had been neglected, all credit had been given to Suersen, whose contribution was published two years later. L and C Ruppe also mentioned in this class the obturators of Brandt and Martinier which were doomed to failure by dint of their complexity.

The massage appliances for use after palatal surgery might not be regarded strictly as obturators, their object being to lengthen the surgically repaired velum, not to occlude a defect. The originator of the technique, was the Russian, Krouschoff (1885): his disciples, apart from Brugger appear to have been exclusively French according to the Ruppe's account.

Consideration of the Ruppe's fourth category, the combination of surgery and prosthesis, is undertaken later in this work²⁶.

1.21 DORRANCE (1933)²⁷ wrote on the history of the surgery of cleft palate, but could hardly avoid some mention of the obturator. Such was made in the section of his work

dealing with lengthening of the velum to provide velopharyngeal seal. The author traced Passavant's series of operations and his final use of a stud to maintain the patency of a small surgical defect in the velum, aimed at lengthening the organ. Dorrance's contention that Gariel offered this obturator long before Passavant, was another of the misrepresentations which seemed to envelope Gariel¹⁶. The use of Schiltsky's obturator following Wolff's operation was also mentioned. Later in his work, Dorrance reviewed the operations of his contemporaries, Pickerill and Gillies, which were specifically designed in conjunction with prosthetic appliances. As all these procedures had been aimed at the same goal as Dorrance's own "push-back" operation, it was hardly surprising that they found little favour.

1.22 SEGRE (1956)²⁸ reviewed the history of the obturator from the viewpoint of a speech therapist. The account was thus notable for its understanding of the physiological bases of various prosthetic devices recommended for congenital clefts of the soft palate. These devices were categorised according to mode of function and Segre's account was sufficiently comprehensive to include a survey of the investigations into the use of the meatus obturator. Although the modern era of this appliance started in the literature in 1928, Segre recognised Hullihen (1850) as having stumbled on the principle.

To the investigator seeking correct historical perspective, Segre's paper was beset with snares and anomalies. He was one of the few who were aware of Sudhoff's short

paper (1924)²⁹ which contended that the Nürnberg barber-surgeon Franz Renner (1557) was ahead of Amatus Lusitanus (1560) in publishing a description of the palatal obturator. The proof of this was Segre's mention of Renner (1557), a rare reference and one which did not appear before Sudhoff's paper. Despite this awareness, Segre had quoted Petronius (1530) as the first to propose the filling in of defects with wax or tow and accredited Amatus' description with the date of 1598. Other early writers to be mentioned were Paré (1561), Fabrizio d'Aquapendente (1594), Hildanus (1610) and Guillemeau (1618).

A familiar series of names was associated with the introduction of the artificial velum, and there there were more errors of understanding. Stearn's appliance was described as being very much like de la Barre's in principle. The only principle they shared was an attempt to make good lost tissue: there were no points of physical design in common. Kingsley (1872) was credited with entering the field some eight years after his reputation was made; his appliance was described as of unvulcanised caoutchouc, whereas he employed soft vulcanised rubber. Segre then reviewed the appliances which had been prominent in the Ruppes' contribution, before consideration of the meatus obturator.

1.23 BEDER (1944)³⁰ prefaced his review of obturators with a slight reference to the history of the appliance. Petronius in the fifteenth century was the first to record the idea of an appliance, although people afflicted with a palatine defect had doubtless improvised before that time.

Paré (1541) had published the first definitive description of an obturator. These somewhat ambivalent remarks were followed by a list of names, without dates of writing, and scant indication of their appropriate contribution.

1.24 PRINZ (1945)³¹, made brief mention of the obturator in his dental chronology; he attributed the first description to Amatus Lusitanus (1554).

1.25 SCHALIT (1946)³² was concerned only with appliances developed to remedy congenital clefts of the soft palate.

He classified these as:

- i Artificial vela.
- ii Surgical-prosthetic methods.
- iii Rigid appliances.
- iv Meatus obturators.

The first class was introduced by mention of Snell (1823) and Kingsley (1864). Elfert (1914) and Sörup (1928) were more recent writers in German whom Schalit mentioned and whose views had not previously received much attention in English Language reviews. The methods of Pickerill also Gillies and Fry comprised discussion of the second class, Suersen and Schiltsky the third.

Schalit himself had been deeply involved in the development of the meatus obturator, thus there was comprehensive coverage of this type.

1.26 PLATT (1946)³³ published a short bibliography on obturators and artificial vela, with mention of four references to the general history of the subject. Of these, two were of minimal value. Friedrichs (1886) had mentioned one or two early authorities in support of his own

contentions and MacFarlane (1894) had again made passing reference in the course of a lecture to a student body.

In 1947 an abstract appeared of Platt's thesis on the history and principles of obturator design³⁴. Platt was a speech therapist and he leant heavily on previously published accounts of his topic, particularly those of Kingsley and Segre: the reference list demonstrated that only one original paper earlier than 1881 had been consulted. Thus perpetuated error followed perpetuated error, starting with Petronius (1530) and following through the early history - e.g. Paré (1541) and Fauchard (1756).

No new contribution was made by Platt's paper.

1.27 WEINBERGER (1948)³⁵ repeated Prinz's assertion and date concerning Amatus Lusitanus and the palatal obturator, but gave greater prominence to Paré's description of the appliance.

1.28 In the historical introduction to his work, McNEIL (1954)³⁶ dwelt as much on the archeological evidence for congenital cleft palate and the early operations for hare lip as he did on the history of the obturator. These latter observations were derived almost entirely from Kingsley's account.

1.29 BADEN (1955)³⁷, covering the period of Ramses II to his own time in eight pages of journal, was bound to encounter confines to his account of the obturator. These limitations were enhanced by some speculative statements, for example; the Egyptians used laminated gold to cover palatal defects: Amatus Lusitanus invented the obturator between 1511 and 1561 (his life span, according to Weinberger).

To these were added the almost customary inaccuracies concerning Paré (1541) and Hollerius (1552) together with some gross new ones. For example:

"Further progress was made by Guillemeau around 1600".
(In fact Guillemeau only reproduced Paré's instrument).

"Heister (1756) perfected Fauchard's appliances".
(Heister's obturator was of a simple sponge design).

Scant regard for accuracy concerning names, dates and classification detracted from the one potentially useful item of Baden's contribution: this was a table indicating authors on the classified aspects of the obturator, artificial velum and prosthetic speech aids.

1.30 LEIBOWITZ (1958)³⁸ was concerned essentially with the contribution of Amatus Lusitanus. In setting the matter in perspective, Leibowitz made accurate reference to Paré (1561) and Fallopio (1564), also calling attention to Christ's paper previously discussed. Leibowitz stated that his paper had been written in consequence of reading Baden's article and the discipline of a trained historian was welcome. The lack of clinical sympathy was noted, however, in the statement that obturators were now obsolete.

1.31 MORIMITSU (1958)³⁹ drew attention to POPP⁴⁰ who had stated that the ancient Egyptians fabricated artificial ears, noses and eyes. There was no actual statement that the Egyptians also manufactured artificial palates; it was left for others to draw this unsubstantiated conclusion. (see paragraph 1.37). In other respects Morimitsu's contribution borrowed from Baden's, repeating errors and introducing new generalisations of questionable accuracy. The

article was completed by reviewing selected papers of recent publication.

1.32. HARKINS (1960)⁴¹ was concerned only with the development of the prosthesis for congenital clefts. Following mention of the usual personalities of the early nineteenth century, Harkins notes largely traced the American contribution. This course was similar to that adopted earlier by Beder, but was in contrast to Martinier and Lemerle and the Ruppes who had emphasised the French developments.

1.33 The historical comments made by OLIN (1960)⁴² were influenced by Platt's account, but were updated by references to recent literature on the meatus obturator. Harkins and Olin were presenting brief historical introductions to their own designs, but Harkins general notes were destined to unquestioned inclusion in a definitive history (see section 1.37).

1.34 BULBULLIAN (1965)⁴³ was concerned with the evolution of maxillo-facial prostheses. Thus some of the familiar names appeared in a slightly different context, Paré for example. The influence of Fauchard on dentures made as recently as 1900 was illustrated, whilst Kingsley was represented by a combined dental and nasal prosthesis described in 1880.

1.35 ROGERS (1967)⁴⁴ presented an account of the treatment of palatal pathology prior to 1816. This was reproduced in substantially the same form in 1971⁴⁵. Rogers' discussion ranged over a wider field than palatal defects but included evidence for the presence of these defects from the earliest civilisations. Mention was also made

of authors from the time of the medical renaissance who had recommended prostheses for acquired defects. These authors were essentially those mentioned by Snell. However, Rogers had obviously sought the original works to verify Snell's references and, in doing so, had traced earlier publication dates. Veracity was still not total, but Rogers succeeded in considerable improvement of the historical perspective.

Despite the supporters of Amatus Lusitanus as "discoverer" of the palatal obturator, Rogers maintained that Paré was aware of the appliance as early as 1537-1539: the publication date he gave, however, was 1564.

Roger's study was one of the more important contributions and aspects of his commentary are discussed in subsequent sections of this work.

1.36 ARAMANY (1971)⁴⁶ ostensibly limited his history of prosthetic management of cleft palate to the period between Paré and Suersen: there was, however, some comment on Demosthenes, Hollerius and Petronius.

With a few minor additions and almost insignificant corrections, Aramany's paper was compounded from material supplied by de la Barre, Snell and Kingsley. He seemed unaware of any of the studies undertaken since Kingsley's time, except for an unpublished thesis by Onachilla (1946), which came to light after the paper was completed

1.37 ADISMAN (1971)⁴⁷ provided the contribution on the history of obturators in a volume intended as an authoritative and comprehensive guide to cleft palate treatment. The contribution detracted considerably from the

credibility of the work. There was an unsubstantiated claim concerning Egyptian prostheses for cleft palate from 2500 BC. Amatus Lusitanus (1511) and Paré (1531) were two errors in dates for their respective descriptions. Even the most accessible literature was quoted through an indirect source (usually Harkins) and no attempt had been made to establish the veracity of references. There was a laziness and inaccuracy in the style which rendered the contribution almost irresponsible. For example:

"Around 1840 surgeons and dentists began to realise the possibility of prosthetic treatment for patients with congenital cleft".

This was a quotation borrowed from Morimitsu.

1.38 HOFFMAN-AXTHELM (1972)⁴⁸ presented a short review of the palatal obturator, which included principle contributors between Renner (1557) and Warnekros, who was a modifier of designs by Suersen and Schiltsky at the turn of the last century. The content of the review, however, contained no new material.

1.39 Conclusion

The review of literature indicated that much of the history of the palatal obturator and artificial vela had been covered, although in a superficial and fragmentary manner, frequently lacking in objectivity. Many accounts had proved to be a collection of names and dates, the latter of variable accuracy; the combination demonstrating little significance. Excepting papers by Christ and Leibowitz, there was no attempt to discern any inter-relation between

the earlier authors who had described appliances. There was also little attempt to explain why the palatal obturator appeared in the literature when it did and why the introduction of artificial vela for congenital defects was so long delayed.

There seemed a need to present a cohesive account of the principle movements in palatal prosthesis design, including some aspects which had been neglected and to correct the compounded errors in chronology.

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CHAPTER 2

THE ORIGINS OF PALATAL PROSTHESIS

2 THE ORIGINS OF PALATAL PROSTHESIS

2.1 Early Evidence of Defects and Chronology of Treatment

McNeil¹ and Rogers² both avowed the presence of congenital cleft palate amongst the Egyptians' civilisation between 2445 and 1731 B.C. Their common authority was the 1924 publication on Egyptian Mummies by Smith and his co-workers. Rogers also pointed to a description of an acquired palatal defect in the Hippocratic collection.

The earliest surgical treatment of those palatal perforations which had disease origins was the chemical cautery of the mucosal borders of the lesion. By this means it was hoped to prevent epithelialisation of the margins, enabling the defect to be closed by organised granulation tissue. The method was well established by the time Renner (1557)³ and Fallopio (1564)⁴ were recommending sulphuric acid based medicaments for the purpose. Houllier's suggestions concerning the surgical suture of acquired defects were published in 1611⁵, but were not generally taken up: the poor chances of repair were probably well appreciated.

Honours for devising the surgical operation for suture of the congenital cleft palate (staphylorrhaphy) were contested between von Graefe and Roux. Wallace⁶ described the circumstances of Roux's operation, undertaken on the Edinburgh medical student, John Stephenson, in Paris during 1819. Roux's claim for the originality of the operation was regarded by some as surgical plagiarism²: it was contended that Roux was aware of von Graefe's 1816

staphylorrhaphy in Berlin.

A hinged soft palate prosthesis was described by Jourdain⁷ in 1778, Jourdain did not make the distinction that this appliance was for congenital clefts: he recommended it for "diseases of the palate". However, from discussion elsewhere⁸, it was manifest that Jourdain appreciated the differing aetiology of congenital and acquired defects. His design was the precursor of many, similar in principle, subsequently to be recommended for congenital clefts.

From this précis, it would appear that there was no authoritative recommended treatment for the known entity of palatal defect for at least 4,000 years.

2.2 Investigations of pre Sixteenth Century Literature

Cullerier⁹ was faced with the dilemma of being unable to find a reference to palatal obturators in the writings of Celsus, Guy de Chauliac or any other author of the twelfth, thirteenth or fourteenth centuries; yet he was certain that Petronius, his earliest source, wrote of the appliance as if it were known before his time. (Cullerier placed Petronius' writing at 1565).

de la Barre misconstrued Guillemeau and stated that the obturator was known to the ancient Greek physicians¹⁰. This misrepresentation stimulated a certain amount of investigation into the source of Guillemeau's supposed assertion. Christ¹¹ realised the error, but nevertheless searched passages in Greek Literature dealing with the palate. He mentioned Homer, Aristotle, Plutarch and Galen: only rudimentary reference was found to palatal obturation

in Hippocrates' second book of the Epidemien. Of this passage, Christ wrote:

"We must recognise in H's advice to insert a sponge into the abscess during eating and drinking the first primitive beginnings of prosthetic treatment for defects of the palate."

Christ believed that Hippocrates was writing of a syphilitic inflammation of the palate. This was by no means an original opinion. In 1736 Astruc had devoted much of the first book of his classic work on venereology to refuting suggestions that the disease was of ancient origin. More specifically, he refused to recognise that maladies referred to in the third book of the Epidemien represented venereal disease¹².

Rogers² did not realise that Guillemeau had been quoted in error and asserted that "a careful and exhaustive scrutiny of the Greco-Roman literature" had failed to support the contention. Details of the scrutiny were not given, but the impression was gained that it had not been undertaken by Rogers.

2.3 The Need for the Palatal Obturator

Few explanations were advanced for the non-appearance of recommended treatment for palatal defects prior to the mid sixteenth century. This situation was in marked contrast to the treatment of cleft lip, which was well documented from the time of Celsus (first century A.D.)¹³.

Lagneau's early explanation that accidents necessitating obturators were too rare amongst the ancients to merit the description of an appliance, ignored the incidence

of congenital or disease lesions¹⁴. McNeil suggested that cleft palate infants either died from subnutrition or were otherwise put to death at birth¹³.

One aspect of the obturator's rise to prominence in the sixteenth century, which no author disputed, was the association with the epidemic of syphilis which swept Europe from the close of the fifteenth century. This epidemic was variously regarded as the introduction of the disease to Europe or the exacerbation of an established but smouldering infection. Astruc firmly believed that syphilis was brought from America (more specifically the West Indies) by Columbus' men and spread from Naples to the rest of Europe by the French armies¹⁵.

Christ¹¹ tacitly subscribed to the alternative view in diagnosing syphilis from the case presentation given by Hippocrates. Rogers was more forthright in his views:

"Let us be quite frank in discussing the history of cleft palate surgery! Its development was held back for many centuries because physicians and surgeons believed that most palatal defects were the direct result of syphilitic infection"².

In support of this contention, Rogers cited Dr. Stephenson's view that treatment of this congenital lesion was not suggested in Edinburgh because his medical friends suspected that it might be of syphilitic origin.

Astruc précised Petronius' view of the cause of syphilis:

"Petronius thought that the disease, like leprosy, measles and smallpox, has for its cause a kind of Aliment; which the foetus attracts from, or necessarily draws to itself, out of the mothers womb."¹⁶

This sixteenth century view, confusing congenital and infective derivations would seem to vindicate Rogers' contention. However, it cannot be allowed that this confusion persisted to the introduction of staphylorrhaphy. Astruc, although quoting Petronius' view did not agree with it. Jourdain's discussion with Levrette (reprinted 1778)⁸ on the cause of congenital palate defects, included reasoning concerned with such possible causes as a rise in intra-uterine pressure. This demonstrated that the differing nature of congenital and infective lesions was well appreciated before Stephenson's birth.

Whatever the reasons behind the late appearance of corrective surgery, it might be supposed that relatively simple mechanical measures would be utilised in substitution. This contention was apparently true so far as acquired, circumscribed lesions of the palate were concerned. Petroni referred to the use of wax, cotton and gold for plugging such defects¹⁷. Before syphilis reached epidemic proportions, there was probably no widespread need for a specifically designed palatal obturator: individuals resorted to simple expedients. These would not merit description in a surgical text. Similarly, the gold plates were probably struck by artificers and an artificer's work would not receive mention in a surgical text. Petroni did not write such a volume: his was a comprehensive account

of syphilis. He probably recorded these simple measures of occluding palatal defects, which he had encountered, for the sake of completeness.

Sudhoff augmented this view when discussing Renner's contribution. Renner's handbook dealt exclusively with venereal disease.

"Such technical devices have obviously been in the hands of practitioners for years, even decades and even achieve a certain progressive development before they find their way into learned publications or before a leading spirit like Paré impresses on them his own personal stamp".

The early and lasting ascendancy of prosthesis over surgery for acquired, circumscribed lesions was not mirrored in the later situation which developed in relation to the congenital cleft. The important difference between the two lesions was the mobile nature of the palatal remnants of the open ended congenital defect. If Jourdain's hinged appliance of 1778 is taken as the first suitable description of an appliance for a congenital lesion, then there was only a lapse of 41 years until von Graefe pioneered staphylorrhaphy. In the context of four thousand years, this lapse becomes almost insignificant.

Explanations were not advanced in the literature for the lack of suitable appliances for congenital cleft treatment. This may be attributed to the approach of many authors who did not consider aetiology of the defect in relation to appliance design. The inventive capacity and technical ability were available before Jourdain's time:

Fauchard's designs from the earlier eighteenth century demonstrate this¹⁸. It may be contended therefore that the appliance had to await not only the emergence of the dental profession, but its establishment. Mechanical aptitude had to be tempered by a degree of physiological appreciation before the soft palate prosthesis became a viable proposition. If taken from the context of a surgical instrument and placed in one of a restorative dental appliance, the new prosthesis is at once in a mainstream of development; its conception achieves some relevance.

2.4 A Contention concerning Demosthenes

Convention decrees that Demosthenes (381-322 B.C.), the Athenian orator and statesman, suffered from a speech impediment. As a form of speech therapy, Demosthenes would stand on the shore and declaim against the waves with a pebble in his mouth¹⁹.

Bien, on a European trip, trod those shores frequented by Demosthenes and examined the sculpture of that Ancient in the British Museum²⁰. The conclusion drawn was that the sculpture exhibited a cleft lip, masked by artistic licence. Thus, reasoned Bien, Demosthenes also suffered from a congenital cleft palate which he obturated with smooth, flat stones collected from the shore.

Aramany²¹, incorporated this contribution to mythology in his paper. It appeared that Bien's sense of humour was in danger of being taken seriously and that his deduction ought to be collaborated or refuted.

Re-examination of Bien's evidence (sculpture number

1840 in the British Museum) demonstrated that the upper lip was covered by a thick moustache which was divided in the midline (see figure 3). There was no suggestion of a cleft lip.

Many portraits of Demosthenes exist, all probably copies of the original erected in Athens 42 years after the orator's death. Their identification was possible following the discovery of a small, named bronze bust at Herculaneum in 1723²².

One may salute Bien's originality of thought, but of necessity refute his contention on the evidence offered.

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2. Rogers, B.O. 'Palate surgery, prior to von Graefe's pioneering staphylorrhaphy (1816)....' *Plast. reconstr. Surg.*, 1967, 39, 1-19.
3. Renner F. Ein Newwohlgegruendet nutzliches und haylsames Handtbuchlein.... (Nürnberg, 1557), p.85.
4. Fallopio, G. De morbo gallico (Padua, 1564), p.62.
5. Hollerii, J. De morbis internis, edited by Duret, L. and Chartre, R. (Paris, 1611), p.704.
6. Wallace, A.B. 'Canadian-franco-scottish co-operation: a cleft-palate story'. *Brit. J. plast. Surg.*, 1966, 19, 1-14.
7. Jourdain, A.L.L.B. Traité des maladies....de la bouche(Paris, 1778), 2 vols., 1, 534.
8. Jourdain, (n.7), 1, 443-451.
9. Cullerier, M.J.C. 'Obturateur' in Dictionnaire des sciences médicales (Paris, 1819), 60 vols., XXXVII, 59.
10. de la Barre, C.F. Traité de la partie mecanique de l'art du chirurgien dentiste (Paris, 1820), 2 vols., I, 298.
11. Christ, J. 'Geschichtliches zur Behandlung der Gaumendefecte'. *Janus*, 1901, 6, 631-541, 587-591.
12. Astruc, J. De morbis venereis libri sex (Paris, 1736), p.4.

Astruc, J. A treatise of the venereal disease, translated by Barrowby, W. (London 1737), 2 vols., I, 6.
13. McNeil (n.1), p.7
14. Lagneau, L.V. 'Obturateur' in Dictionnaire de médecine (Paris, 1826), 21 vols., XV, 201.

15. Astruc (n.12), Latin ed. pps. 4 and 15. English ed. I, 6 and 23.
16. Astruc (n.12), Latin ed. p.485, English ed. II, 325-326.
17. Petroni, A.T. De morbo gallico (Venice, 1567), p.213.
18. Fauchard, P. Le chirurgien dentiste ou traité des dents (Paris, 1728), 2 vols., II, 285-331.
19. 'Demosthenes' in Encyclopaedia Britannica, 3rd. ed. (Edinburgh, 1797), 20 vols., V, 749-750.
20. Bien, S., 'Why Demosthenes mouthed pebbles'. Lancet, 1967, ii, 1152, also Ann.Dent. (Baltimore), 1969, 28,8.
21. Aramany, M.A. 'A history of prosthetic management of cleft palate: Paré to Suersen'. Cleft Palate J. 1971, 8, 415-430.
22. Richter, G.M.A. The portraits of the Greeks (London, 1965), 3 vols., II, 215-223.

CHAPTER 3

WRITERS ON THE PALATAL OBTURATOR IN THE MEDICAL LITERATURE OF THE SIXTEENTH AND SEVENTEENTH CENTURIES

(Presented in chronological order of publication)

3 WRITERS ON THE PALATAL OBTURATOR IN THE
MEDICAL LITERATURE OF THE
SIXTEENTH AND SEVENTEENTH CENTURIES

3.1 FRANZ RENNER (d. 1577)

3.1.1 Bibliography and Biography

Attention was called to Renner and his contribution in recording methods of occluding syphilitic perforations of the palate by Sudhoff, in 1922¹. Segre² and Leibowitz³ were the only subsequent authors to acknowledge the significance of Sudhoff's paper, which introduced the earliest date for a published description of these methods.

Details of Renner's life were difficult to obtain. He was not mentioned in any of the standard bio-bibliographies and was excluded from Astruc's review of the works on venereal disease prior to 1736. Renner's dates of birth and death could not be ascertained: however, the church registers in the city archives of Nürnberg disclosed that Renner was buried on 25th February 1577⁴.

The Librarian of the City Library in Nürnberg, where Renner was surgeon to the city, confirmed Sudhoff's reference⁵ and provided a photocopy of the text. Renner completed the script for his book on 17th December 1556; he entitled it:

"A new and well-founded and useful, salutary little book of common practice of all internal and external medicine, against the horrible and loathsome French

disease and paralysis; also for all other sicknesses which follow from these diseases and how they may be recognised and brought to a complete cure".

Printing was undertaken in Nürnberg during 1557. The pages were numbered only on the left side of each opening.

3.1.2 Translation of the Relevant Passage

"Further we may note particularly where part of the bone of the palate is, of necessity, removed or falls out of its own accord so that a hole remains. This will never be brought together or closed again, so that speech is generally distorted or one snuffles and speaks through the nose. In this case, we must be particularly careful that the injury is thoroughly cleansed and healed so that there is a round vault shaped healing, that one needs some physic which draws such holes together violently. As a comparison, we may think of a pouch pulled together with another by a strap, which can here happen with the appropriate physic. Particularly with the water hereafter described, which in this case pulls the holes so that they are knitted closely together and therefore they are quite narrow and small, however many may be formed.

Rx Fruit of the cypress

Burnt Alum

Sulphuric Acid

Pyrethrum

Olibanum

Mastic

Camphor

Gall nuts

Rind of pomegranate


Flower of the red rose: of each 1 drachm.

Powder and mix with distilled wine and water of oak leaves, of each 5 ounces; acid of amber (succinic acid) and of quince, of each $\frac{1}{2}$ ounce.

Alternatively;

Rx Camphor, 2 drachms dissolved in spirit, $1\frac{1}{2}$ ounces

"You may like to use one such astringent and water, whichever is most convenient according to the occasion, a small sponge or piece of cotton attached to a suitable instrument or a quill, moistened therein, and then passed through the hole two or three times daily and thereby the opening can be most easily brought together after the fourth or sixth washing with rose honey so that the inflammation round the burn is lessened.

*"Further one may fill the hole in the palate, which by nature and the appropriate medicine will not close (even when healing is complete) with a small sponge cut according to the size of the hole, and then, as we have said, it is plugged into the hole and straightened, so that you no longer snuffle and talk through the nose, which otherwise happens, and which many people put up with; therefore such holes are filled with softened leather of such a shape; one takes two or three pieces of leather, round or disc-shaped according to the form of the hole, these are fixed one on the other so that they have this shape  . Then whatever the size

of the hole, these leather pieces are so arranged that the upper part comes inside the hidden palate, and the other lies below at the visible palate, so that one can hold the other and can cover and depress the opening, so that speech is unimpeded; some have these models made of ivory or of gold or silver, as has been described and sketched according to the pattern; which is also twisted into such an opening, or put in and taken out, as necessity teaches us, but those made of bone, gold or silver are not so bearable as those made of sponge or leather and I do not like them for this reason, that it is painful to remove or insert them and sometimes they fall out of their own accord, which can occur unexpectedly and contributes to their falling into the oesophagus, and one has to run a considerable risk until they are withdrawn, or one would choke or suffer some other injury."

3.1.3 Commentary on the Text

Sudhoff's quotation started from the asterisk, but the passage immediately prior to this indicated that the obturating device was a secondary consideration in the treatment of the acquired defect. Principal effort was devoted to local treatment of the lesions by medicaments. It was recognised that the perforations could never be obliterated, but their size was first reduced by the use of astringent recipes. The format of this treatment was to appear in the works of subsequent authors, often associated with general purging of the subject. The ingredients of the recipes were also standard and figured repeatedly in

various combinations.

Occluding devices were manifestly well established before mention by Renner: he had experience of several materials and from this experience was able to express a preference. As no earlier description of these devices was found, it might be assumed that Renner's attitude towards them was at variance to that of previous authors. It was suggested in an earlier discussion that, prior to Renner's time, the physician or surgeon did not concern himself with mechanical contrivances for palatal defects: this was within the scope of the artificer or the patient's ingenuity⁶. To a medical man, the prescription of an obturator might represent a tacit admission of the failure of his *recipés*. Here perhaps was an explanation of the number of subjects who, according to the text above, continued to suffer from indistinct speech. Renner, however, had rather more faith in his observation and was prepared to affirm that it was not possible to gain complete occlusion of defects by the simple application of physic.

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Janus, 1924, 28, 451-455.
2. Segre, R. 'Die prothetische Behandlung der Gaumens-
palten'. 1936, 70, 865-884.
3. Leibowitz, J.O. 'Amatus Lusitanus and the obturator
in cleft palates'. J. Hist. Med., 1958, 13, 492-503.
4. This information derived from a copy of correspondence
between Professor Dr. W. Hoffman-Axthelm and the city
librarian of Nurnberg, kindly made available by Pro-
fessor Hoffman-Axthelm.
5. Renner, F. Ein Newwohlgegruendet nutzliches and haylsames
Handtbuchlein.... (Nürnberg, 1557), 85-86.
6. See section 2.3

3.2 JOÃO RODERIGUES

(Amatus Lusitanus 1511-1568)

3.2.1 Biography

The principal source of biographical information was Friendenwald's contribution¹. This also proved to be Leibowitz's source², whilst Bayle and Thillaye's account³ agreed in general terms. An ardently chauvinistic rendering of Amatus' life and invention of the palatal obturator was made by Boléo⁴; unfortunately it lacked the authority of references and was inaccurate in detail.

Amatus was born João Roderigues in 1511 at Castelo Branco, a town in the province of Beira, Portugal. His parents were Jews and had been expelled from Spain in 1492. In 1497 they became Marranos (neo-Christians by enforced baptism), the alternative was to be sold into slavery. Amatus studied medicine at Salamanca and obtained a degree about 1530. He returned from Spain to Portugal, establishing himself in Lisbon in 1532. The young physician foresaw the Inquisition in Portugal (instigated by Pope Leo III in 1536) and left to travel in France and the Low Countries, arriving for a sojourn in Antwerp about 1533. His stay lasted for 7 years, during which his first work (on botany) was published; "Index Dioscordis" by Joannes Rodericus Castelli albi Lusitanus.

In 1540, Amatus was invited to the chair of Medicine in Ferrara - Jews were well tolerated there and Amatus remained for a further seven years. In 1547 he demonstrated the valves of the veins, without appreciating their

significance. In the same year he resigned his chair and took up residence in Ancona whilst awaiting the call to become the municipal physician of Ragusa (Dubrovnik). The call was delayed however, giving Amatus time to complete the writing of his first centuria (a volume of one hundred case histories) by 1549. Visits were made to Venice and Rome, where the second centuria was completed in 1551. By the time Amatus returned to Ancona, Pope Paul IV had been elected (1555) and great restrictions placed on Jewish and Marrano physicians. Amatus' home was broken into and valuables and manuscripts stolen. He fled to Pesaro (1555-1556) and eventually Ragusa (1556-1558) before joining the Jewish community in Salonica, where he was free to profess Judaism and take the name of Amatus. As this name was used almost exclusively in the literature in preference to the vernacular form, the convention is continued in this work.

Amatus' travels are summarised in figure 4.

3.2.2 Bibliography

Both Leibowitz and Boléo made the point that Amatus was a scholar of considerable ability. The former mentioned the high standard of written Latin and the latter made a valid contrast with Paré in this respect.

The major work was the publication of the seven centuriae between 1551 and 1566. The history dealing with the palatal obturator or "extraordinary artifice" was the fourteenth case of the fifth centuria⁵. The manuscript of this section of the work lead a peripatetic existence before coming to publication in 1560. It was lost with

many of Amatus' possessions at the time of the flight from Ancona. Having been recovered through the aegis of a certain Hodara, merchant of Salonica, the manuscript was completed in Pesaro, revised in Ragusa and published in Venice. Due to these delays, the closing date of the fifth centuria was 5320 a creatione mundi (1560 A.D.) whilst the sixth centuria was completed in the previous year.

3.2.3 Amatus Palatal Obturator

Commentary on Amatus' palatal obturator was provided by Boléo⁴, Christ⁶, Leibowitz², Rudy⁷, and Salomon⁸. Of the two English translations of the text under discussion, that of Leibowitz was preferred. The rendering by Boléo was incomplete and inaccuracies followed its translation through Latin, Portugese and English.

Leibowitz's translation ran as follows:

"The fourteenth curatio treating of a somewhat extraordinary artifice to restore voice which was totally lost as the result of an ulcer of the palate.

"A Greek nobleman, boasting of his descent from Greek emperors, developed various ulcers due to Morbus Gallicus of which he was cured by an optimal but strictly constituted diet, by the drinking of a guaiac decoction for forty days, thereafter by wax ointments of mercury on the thighs and arms, and finally by taking again the guaiac decoction. There remained only one conspicuous ulcer, in the high part of the palate, which did not cicatrize with any medication. In this location, rather, a perpetual foramen persisted; in consequence, this man lost entirely the

faculty of speech and voice. Pay attention to the way we met the exigency of such a severe ailment in order to make the man talk adequately. I invented the following extraordinary artifice which made possible a correct and distinct speech, as if he had never had any illness. Such is the nature of this artifice:

"I ordered a goldsmith to prepare a golden-headed nail; the head of the nail was round and broad enough to close the total circumference of the foramen, whereas the tip of the nail was narrow and round; at its centre an ear, lentil-shaped, was prominent. To the said tip, or spike, of the nail, a small sponge was fitted, and this the patient had to introduce at the same time into the foramen where it expanded with moisture and so remained fixed in position. Thereby he was able to speak correctly as if nothing ailed him. Thereafter he took out the instrument twice a day, namely in the evening and in the morning, washed the sponge, squeezed it out with his fingers, and introduced the instrument again, being thus able to talk in a correct and elegant manner as if he had no illness. On removing it he was totally deficient of speech which recovered when he replaced it again. Hence, it is only right to number the palate among the other requirements for speech. By this instrument an uncommon glory in the medical art has been attained. While writing this down here at Ragusa, we have now carried out a similar work on Samuel Erqui, a young Hebrew. Incidentally the nail may be made both of gold and of silver or of lead."

3.2.4 Comment on the Fourteenth Curatio

Amatus' verbal description bore a close resemblance to the illustration which Paré gave of his first type of obturator⁹. The sponge was apparently "spiked" on a simple nail in the former's design, whereas it was more securely grasped by prongs in the latter's.

The guaiac therapy which Amatus applied for the morbus gallicus was an established procedure which Ulrich von Hutten was said to have introduced in 1519¹⁰. Fallopio¹¹ and Petronius¹² later prescribed treatment based on identical principles which they described in greater detail.

3.2.5 Amatus' Share in the "Discovery" of the Obturator

An accident of history resulted in Amatus publishing a description of a palatal obturator in the year previous to Paré. As implied by the discussion above, Amatus must have written the fourteenth case history of the fifth centuria many years before it was eventually published. Christ reasoned that it was "at the end of 1553, or January 1554 at the latest." Weinberger¹³ and Prinz¹⁴ both estimated 1554. The evidence for the length of Paré's experience with the obturator will be discussed subsequently¹⁵, but it was not possible to define this as closely as scholars had been able to achieve in Amatus' case.

As Sudhoff was alone in providing evidence of a written description of a palatal obturator prior to 1560, debate had centred around Amatus and Paré for the honour of "inventing" the palatal obturator. Such debate does not merit further discussion in the light of the evidence presented in sections 2.3 and 3.1.3. There was no reason to doubt Amatus' claim,

supported by Christ, that his appliance had been originally devised. Medical communication of the era made it entirely possible for parallel thoughts and lines of treatment to be pursued in isolation. Even Boléo, arch-advocate of Amatus as the inventor was forced to admit:

"Bibliographically speaking, Amatus' publication preceded Paré's by thirty years, which one, in fact, used the obturator first in clinical experiment is difficult to say."

The author's chronology was incorrect but one must agree with the remainder of the sentiments.

1. Friendenwald, H. The Jews and medicine (Baltimore, 1944), 2 vols., I, 332-380.
2. Leibowitz, J.O. 'Amatus Lusitanus and the obturator in cleft palates'. J. Hist. Med., 1958, 13, 492-503.
3. Bayle, A.L. and Thillaye, A.J., Biographie médicale par ordre chronologique (Paris, 1855), 2 vols., I, 226.
4. Boléo, J. 'Amato Lusitano inventor do obturador palatino'. Rev. port. Estomat., 1966, 7, 73-81. See also: Amatus Lusitanus, the inventor of the palatine obturator (Castelo Branco, 1968).
5. Amatus Lusitanus. Curationum medicinalium centura quinta (Venice, 1560), curatio 14, 42-43.
6. Christ, J. 'Geschichtliches zur Behandlung der Gaumendefecte'. Janus, 1901, 6, 531-541, 587-591.
7. Rudy, H. 'Amatus Lusitanus', Archeion, 1931, 13, 424-439.
8. Salomon, M. 'Amatus Lusitanus und seine Zeit.' Z.klin. Med., 1900, 41, 458-495; 1901, 42, 129-160.
9. See figure 7.
10. Rogers, B.O. 'Palate surgery prior to von Graefe's pioneering staphylorrhaphy.....' Plast. reconstr. Surg., 1967, 39, 1-19.
11. See section 3.4.3.
12. See section 3.5.4.
13. Weinberger, B.W. An introduction to the history of dentistry (St. Louis, 1948), 2 vols., I, 401.
14. Prinz, H. Dental chronology (London, 1945), p.44.
15. See section 3.3.6.

3.3 AMBROISE PARÉ (1510-1590)

3.3.1 Biography

The great surgeon's contribution is more readily appreciated in the context of his life's work. He was born in 1510 at Bourg Hersent, now part of Laval, in Maine¹. His father was in the service of the Seigneur de Laval and Ambroise followed his brother Jehen's example in becoming apprenticed to a barber-surgeon. Details of the apprenticeship are not known, except that part was served in Paris.

It was customary at that time for apprentices to attend lectures given early in the morning, before the start of the day's work. The professor or physician conducted the lecture by reading from his authority, in Latin. Apprentice lads, such as Paré, who had no Latin, thus learned little unless their teacher subsequently consented to discuss his readings in French.

Paré was in Paris during 1533 when the plague was raging and became compagnon chirurgien (house surgeon) at the Hôtel Dieu whilst still a student. This invaluable appointment lasted for three years after which Paré embarked on his divided career, the two aspects of which ran in parallel. During the peace he was in civilian practice in Paris: in times of war, he served with the armies.

As a military surgeon, Paré initially had no recognised position: he would attach himself to the entourage of one great man and then another. As the success of his methods became known, his services were in much demand.



3.3.2 Paré's Medico-Social Status

In 1539 Pare returned from his first military campaign at Turin and remained in Paris until 1543. During this sojourn he qualified as a master barber-surgeon (1541), married and started work on his book dealing with gunshot wounds².

The Parisian medical world of the time was divided into three clearly defined strata. The barber-surgeon occupied the lowest stratum. A surgeon, who had passed through an anatomy school, gained surgical skill as an assistant and was admitted to the Confraternity of St. Cosmo, occupied a rather elevated status. The final (and highest) stratum was composed of the physicians of the Faculty who prided themselves on their medical superiority. Paré's achievement in being appointed surgeon-in-ordinary to Henri II in 1552, whilst only a barber-surgeon, was thus noteworthy.

It was desirable that a surgeon-in-ordinary to the king should be numbered amongst the Confraternity of St. Cosmo. The formalities of the examination were dealt with expeditiously - though not without token incident - and the embarrassment of Paré publicly reading a thesis in Latin was surmounted. The king's surgeon was admitted to the Confraternity in 1554, an event which the Faculty derided³. Paré was elevated as premier surgeon to Charles IX in 1561, but his request for supremacy within the Confraternity (made in 1587) was refused.

In his later years, Paré commanded considerable respect. The plea, shortly before his death, to the Archbishop of Lyons for the raising of the siege of Paris in 1590 was said to have been deeply moving⁴.

3.3.3 Journeys in Diverse Places

Paré detailed his travels, and consequent practical experience of surgery, as an answer to criticism of his methods by Etienne Gourmelen, Dean of the Faculty of Physicians. This defence appeared as the "Apologia and journeys to diverse places" in the fourth edition (1585) of "Les oeuvres", (the collected works)⁵. Commentary on the journeys was provided, inter alia, by Paget⁶ and Keynes⁷.

The relevance of the journeys to Paré's description of the obturator is discussed in a subsequent section. Those journeys undertaken prior to 1561 are pertinent to the discussion, and were as follows:

1537 Mount Cenis and Turin. The Transalpine War.

1543 Marolle and Low Brittany (Brest).

(Battles against the English).

1543 Perpignan. (Battle against the Spanish).

1544 Landrecies.

1545 Boulogne.

1552 Toul, Metz and Verdun. (Battles against the Germans).

1552 Danvilliers.

1552 Chateau Le Comte.

1553 Hesdin

1557 St. Quentin and La Fère.

1558 Amiens.

(See figure 5 which has been compiled from references made by Paré in his "Journeys to diverse places").

3.3.4 Bibliography

Paré's description of two palatal obturators is the most widely quoted sixteenth century work on the topic;

authors rarely investigated the source adequately and hence the literature features an implausible range of dates for Pare's original text. Years cited include 1531⁸, 1541^{9,10,11}, 1561^{12,13}, 1564¹⁴, 1575¹⁵, 1579^{16,17}, 1594¹⁸ and 1595¹⁹.

The detailed bibliography of Paré's work compiled by Doe²⁰ was used as a basis in seeking the first published description of the surgeon's obturators. It was found in "La methode curative des playes et fractures de la teste humaine" published in 1561²¹ (cf.^{12,13}). The description was subsequently included in "Les oeuvres" and was traced through the following editions:

1st. edition, Buon, Paris, 1575. In French.

2nd. edition, Buon, Paris, 1579. In French.

3rd. edition, du Puys, Paris, 1582. In Latin.

(The translation is commonly supposed to have been by Jacques Guillemeau, whose name appeared on the title page. Doe²² pointed out that in the dedication of the work to Marc Miron, premier physician to Henri III, Guillemeau stated that the translation was by a friend who did not wish his name to appear. Cullerier²³ seemed to suggest that the true translator was Eussenbachius of Frankfurt a.M. It is known that the physicians considered themselves to have a sole right for the translation of medical works into Latin²⁴. A manoeuvre on Guillemeau's part could, therefore, have been made to allay the physicians' ire. The Latin translation was reproduced by Uffenbach in 1610²⁵).

4th. edition, Buon, Paris, 1585 In French.

9th. edition, Rigaud et Obert, Lyons, 1633 In French.

1st (English) edition T. Cotes, London 1634.
2nd (English) edition R. Young, London 1649.
(Thomas Johnson made the English translation "out of
Latin, compared with the French"²⁶. Keynes questioned
how much comparison was actually made²⁷).

The death of Henri II (1559) from a jousting wound may well have instigated the writing of "La méthode....." as the case is described in detail in the volume. At the king's deathbed Paré would have encountered Vesalius for the first time; each had served at the Hôtel Dieu, Paré having followed Vesalius after an eighteen-month interval.

Doe²⁸ added that:

".....many French translations of surgical text books were being published about this time, among them those of Héry, Franco and Lefèvre's rendering of Hippocrates 'Des plaies de la tête'".

The time was thus right for Paré to present his views.

The relevant description taken from the first edition of "Les oeuvres" appears in figure 6. The original text of the description of the obturators made by Paré is reproduced in figure 7.

A literal translation from the Latin of the third edition of "Les oeuvres" may be rendered:

"It may not be uncommon that a part of the palatal-bone may be broken by a missile from a fire-throwing mortar, or that, eaten away by decay of a virulent lues, it may fall away, in consequence of which it may be that a sick man may speak less clearly but more obscurely and thickly.

So to these we are led to bring some help by our skill.

"This will be done by filling the gap in the palate with a silver or gold plate a little larger than the gap itself. But in thickness it should not exceed the thickness normal in a gold coin, and in the shape of a tortoise's shell. To its exterior part, namely that which must be placed towards the brain, a small sponge tied on will cling. When this has presently been soaked with the fluid dripping from the brain, becoming swollen, it will fill the gap so that the plate itself is unable to drop out, but will adhere of itself and will remain as if fixed there.

"The shape of these instruments or plates is of this kind, whose use is exactly as I have described. I have proved this not once, but by frequent experience in the Transalpine Wars"²⁹.

Thomas Johnson's translation³⁰ of the same text, compared as it may have been with the original French, allowed of a more free expression:

"Many times it happeneth that a portion or part of the bone of the pallat being broken with the shot of a gun, or corroded by the virulency of the lues venera, falls away, which makes the patients to whom this happeneth, that they cannot pronounce their words distinctly, but obscurely and snuffling; therefore, I have thought it a thing worthy the labour to shew the meanes how it may be helped by art. It must be done by filling the cavity of the pallat with a plate of gold or silver a little bigger than the cavity its selfe is. It must be as

thick as a French Crowne, and made like unto a dish in figure, and on the upper side, which shall be towards the braine, a little sponge must be fastened, which, when it is moistened with the moisture distilling from the braine, will become more swolne and puffed up, so that it will fill the cavity of the pallat, that the artificial pallat cannot fall down, but stand fast and firme, as if it stood of it selfe. This is the true figure of those instruments, whose certain use I have observed not once or twice, but by manifold triall in the battels fought beyond the Alpes."

3.3.5 Discussion of the Texts

It may be discerned that the same plates were used for the illustrations of the instruments in "La méthode...." and the first edition of "Les oeuvres". The sponge obturator was described fully in the text whilst the more elaborate turnbuckle was presented merely by an annotated illustration. This might suggest that the turnbuckle was a design of Paré's which had not been put to the practical test; a view which might also be supported by the evidence that the presentation was never elaborated upon in later editions published during Paré's lifetime.

The dimensions of the gold plate for the obturator were compared to those of an "écu" in Pare's own writing. The identity of the coin was lost in the Latin translation, but re-emerged in Johnson's translation as a French Crowne. The actual dimensions of a Henri III écu were: diameter 26 mm: thickness 0.5 mm³¹.

A further licence introduced by the Latin translation concerned Paré's practical experience of his instruments.

An English rendering of the two final sentences of the main text in figures 6 and 7 would be:

"And by these means (i.e. the provision of an obturator) the voice will form better; a fact which I have seen to occur in the wars sometimes by shots from harquebus or other (weapons), and principally, as I have said, by ulcers accruing from syphilis. Now then you have here the likeness of the instruments about which mention is made."

Comparison should be made with the final paragraph of the translation from the Latin. It is evident from Paré's own writing that the phenomenon he had witnessed in the wars was the loss of voice quality due to palatal perforation. The translator into Latin varied the sense, indicating instead Paré's success with his palatal obturator, not merely in the wars, but more specifically in the Transalpine War.

The latter is an interesting point as, by 1561, Paré had seen service as a military surgeon at a diversity of battlefields. (See figure 5).

Guillemeau was a student of Paré at a time when his master's attendance at campaigns was drawing to a close. He could not therefore have first hand witness of the cases Paré wrote of in 1561. If Guillemeau was responsible for the translation, its specific mention of the Transalpine War might have been made because Paré had spoken to him particularly of the use of the obturator there, or from a desire to extend the master's experience as far as possible.

Doe regretted the poor quality of the Latin translation in Guillemeau's name³², but this latter dissonance was

based more on editorial features than factual presentation.

Attention was drawn by Christ¹³ to the inaccuracies of Kingsley's rendering of Paré's work³³; these had been multiplied when translated into German by Holländer³⁴. Brugger had perpetuated the errors in his book³⁵. The chain of translation was probably even longer than Christ imagined; he surmised Kingsley's source to have been a direct translation from Paré's French. More probably, however, Kingsley derived his quotation from the Thos. Johnson English translation.

Christ discussed Paré's contribution using as his authority Malgaigne's annotated edition of "Les oeuvres"³⁶. The following argument was derived from this source:

The phrase "We have found a remedy with the help of our art", by which Paré might conceivably be claiming as his own the invention of the obturator, dates only from 1579. In 1561 and 1575, Paré had written "they can recover their speech by the aid and ministry of our art". Christ used this as an indication that Paré became familiar with the writings of Amatus Lusitanus on the subject between 1575 and 1579. As a result, Paré felt obliged to press the originality of his own contribution more strongly.

Sudhoff defended Paré against such impeachment in forceful terms³⁷.

"The great Paré obviously did not look upon palatal obturators as an original idea, but his combination of metal plates and protruding sponges or rotating discs at the other end guarantee to a certain extent the fixing in the cavity of the nose. Paré's statement acquires

therefore increasing significance, that of Amatus sinks almost into insignificance."

The authors cited at the beginning of section 3.3.4⁽⁸⁻¹⁹⁾ had viewed Paré's contribution in the context of obturator chronology. Other writers have placed Paré's obturators in contrasting settings.

Gibson³⁸ reviewed the obturator amongst the plethora of prostheses which the surgeon devised. Walters and Saad³⁹ placed the appliance in the context of Pare's contribution to dentistry. Neither article threw any new light on the obturator, but both helped to place Paré's diverse achievements into perspective.

1. Paget, S. Ambroise Paré and his times (New York and London, 1897), p.11.
2. Ibid., p. 122.
3. Ibid., 174-174.
4. Ibid., 7-9.
5. Paré, A. Les oeuvres (Paris, 1585), 1207-1245.
6. Paget (n.1), 118-156.
7. Keynes, G. The apologie and treatise of Ambroise Paré (London, 1951), ix-xxii. See also bibliography p. xxiii.
8. Adisman, I.K. in Grabb, W.C., Rosenstein, S.W., and Bzoch, K.R. Cleft lip and palate (Boston, 1971), p.617.
9. Baden, E. 'Prosthetic therapy of congenital and acquired clefts of the palate'. J. Hist. Med., 1955, 10, 290-301.
10. Kingsley, N.W. 'Obturators ancient and modern'. Johnstons dent. Misc., 1877, 4, 361-366.
11. Beder, O.E. 'Obturators: a review'. J. oral Surg., 1944, 2, 356-368.
12. Leibowitz, J.O. 'Amatus Lusitanus and the obturator in cleft palates'. J. Hist. Med., 1958, 13, 492-503.
13. Christ, J. 'Geschichtliches zur Behandlung der Gaumendefecte'. Janus, 1901, 6, 531-541, 587-591.
14. Rogers, B.O. 'Palate surgery prior to von Graefe's pioneering staphylorrhaphy (1816).....'Plast. reconstr. Surg., 1967, 39, 1-19.
15. Cullerier, M.J.C. 'Obturateur' in Dictionnaire des sciences medicales (Paris, 1819), 60 vols., XXXVII, 59-67.

16. Aramany, M.A. 'A history of prosthetic management of cleft palate: Paré to Suersen'. *Cleft Palate J.*, 1971, 8. 415-430.
17. Snell, J. Observations on the history, use and construction of obturateurs (London, 1824), p.10.
18. Boleo, J. 'Amato Lusitano inventor do obturator palatino'. *Rev. port. Estomat.*, 1966, 7, 73-81.
19. Rogers, W. Dictionnaire des sciences dentaires, 2nd. ed. (Paris, 1847), p.472.
20. Doe, J. A bibliography of the works of Ambroise Paré (Chicago, 1937).
21. Paré, A. La méthode curative des playes et fractures de la teste humaine (Paris, 1561), 261-262.
22. Doe (n.20), p.158.
23. Cullerier, M.J.C. 'Memoire sur les obturateurs du palais...' *J. gén. Méd.*, 1804, 12, 12-36, (see p.16).
24. Paget (n.1), p. 204.
25. Uffenbach, P. Thesaurus chirurgiae (Frankfurt, 1610), p.488.
26. Johnson, T. The works of that famous surgeon Ambroise Paré (London, 1634), title page.
27. Keynes (n.7), p.xxii.
28. Doe (n.20), p.51.
29. Pare, A. Opera (Paris, 1582), p. 662.
30. Johnson (n.26), p.873.
31. Carson, R.A.G. Personal communication (1969).
32. Doe (n.20), 158 and 170.
33. Kingsley, N.W. A treatise on oral deformities as a branch of mechanical surgery (New York, 1880), p.216.

34. Kingsley, N.W. Anomalien der Zahnstellung und Defect des Gaumen. Deutsch von L. Holländer. (Leipzig, 1881).
35. Brügger, H. Behandlung der gaumenspalte mit besonder Berücksichtigung der prothesen mit korkken (Basle, Leipzig, 1895).
36. Malgaigne, J.F. Oeuvres completes d'Ambroise Paré (Paris, 1840), 3 vols., II, 607-608.
37. Sudhoff, K. 'Vom Alter des Gaumenobturators'. Janus, 1924, 28, 451-455.
38. Gibson, T. 'The prostheses of Ambroise Paré! Brit. J. Plast. Surg., 1955, 8, 3-8.
39. Walters, H. and Saad, M.N. 'Ambroise Paré on dentistry'. Brit. dent. J., 1970, 129, 431-436.

3.4 GABRIELE FALLOPIO (1523-1562)

3.4.1 Biography

Fallopio was born in Modena in 1523. Dates given for his death varied but the "Dictionnaire encyclopedique des sciences médicales" quoted 7th October 1562: the authority for this date came from the preface of Fallopio's "Opera omnia", vol. II, 1600 edition.

Fallopio studied at Ferrara under Brasavola and in Padua as a disciple of Vesalius². He was, for some time, a canon at the cathedral in Modena. The church was not enamoured of his affinity for dissection however, and he was forced to give up his benefice to continue his anatomical research as he wished.

Fallopio returned to Padua for a few months and then occupied the chair in Pisa for 3 years. He was back in Padua in 1551 as professor of anatomy and surgery - an appointment which was linked with the directorship of the botanical gardens. Whilst holding these appointments, he travelled in Italy, France and Greece.

Fallopio had great respect for Vesalius but did not hesitate to correct errors in the latter's teaching. For example, Fallopio showed that teeth were generated twice; the permanent dentition did not arise from the roots of the deciduous as stated by Vesalius³.

Remembered principally as an anatomist (Fallopian ligament and Fallopian tubes), it was obvious from his writings that Fallopio was also a surgeon of experience and attainment despite his early death. This factor of

Fallopio's death at the age of 39 was one which was overlooked by Christ when he extolled Fallopio's experience with the palatal obturator at the expense of Paré⁴. However much one may wish to detract from Paré's attainment, it cannot be done on the grounds of a lack of practical surgical experience.

3.4.2 Bibliography

As Cullerier and Snell neglected to mention that Fallopio had devised a palatal obturator, his contribution was largely neglected by the literature⁵. Leibowitz made mention of Fallopio⁶: his source was probably Christ⁴, who alone had investigated the original material in any depth and had given some detail of the manner in which Fallopio presented the appliance.

The reference to the palatal obturator was found in the posthumous "De morbo gallico" of 1564⁷. From the title page it was apparent that Fallopio had dictated the substance of the book to Petro Angelo Agatho of Matera. Whether this dictation was in the course of the master's lectures, or whether it was specifically given with publication in mind could not be discerned. Agatho added "certain worthy comments" which he indicated by parentheses. No parentheses appeared in the original text of Chapters 97 and 98, the translation of which is given below, and so it may be assumed that the text was that of Fallopio.

3.4.3 Translation of Fallopio's Text

"CHAPTER XCVII - A remedy when the bone of the palate falls".
"If the bone of the palate falls in, and the man is cured,

but there follow unbearable miseries and difficulties. Firstly, as he is unable to speak, secondly as he is unable to drink because the wine runs back into the cup from his nostrils. He cannot speak because the voice comes out through the nostrils and so there can be no proper articulation. In this latter case it is necessary that we should make an examination to see whether there is a large falling away of the bone. For if as much bone has collapsed as the size of a coin which is called a gazetta, then we cannot hope for a joining together, but it is necessary to find some artificial device by which the palate may be closed. Therefore we must endeavour to cause scar tissue to grow quickly around the orifice with astringent decoctions. After the scar has developed one must block the hole with something which will not fall. Here we sometimes plug it with cotton and many do this successfully. But, masters, it sometimes happens that the size of the opening does not hold the cotton. Then we have two instruments, one of wax, the other made from silver. These ingenious instruments are complicated. I cannot describe them in words; I will send you the instrument made from wax, and will show you the method of construction and so it may be made from silver or gold. I am accustomed each day to take it out, cleanse it and once more set it (into place). But there is another device which we roll up from cotton and place it by force in the hole.

"But I had a certain teacher having a palate eaten away by the French disease so that there was no place

where we could fit the instrument, for there was nothing left of his palate. I fashioned an instrument to his nostrils, a chain of gold, indeed, in the part bordering on his uvula, which I made to run out through his nostrils, and so that the nostrils should not be worn away by the gold, I helped with twin gold plates positioned under the gold chain.

"But if the size of the erosion of the palate is small, in that case a regrowth of the flesh can be hoped for. But there is a need of great care, for it is essential that you should not permit the ulceration to be covered by a scab, but that it should always be kept fresh. Now it may be kept (thus) if every fifth day, or fourth, the margin of the ulceration is moistened a little, only once with cotton dipped in oil of vitriol; but it is necessary that a medicated packing should be placed there which has the power of stimulating the growth of the flesh.

"I have cured many, and especially the famous Polonius, for I use packings of these kinds; the first is a decoction of guaracum in which is dissolved myrrh and frankincense, so that by this means the palate may harden; the second treatment is a certain paste from which I fashion a stopping which I place in the hole and I have often used this with marked success. Now the medicament is as follows:

Rx gum elemi and amber, of each $\frac{1}{2}$ ounce; of boiled pine resin, 1 ounce; white wax, 1 ounce; gum of frankincense, $1\frac{1}{2}$ drachm; of common oil, a sufficient quantity.

Mix and fashion a soft wax which I take and with my fingers shape a stopping the size of the hole. I wash it with the aforesaid liquid or with ol. sulf. in small quantity. Sometimes I wash the bone with waters of the hot springs of St. Peter sprinkling it with powdered orris root and so I achieve marked success".

"CHAPTER XCVIII Concerning Gallic Ulcers".

"Syphylitic ulcers are wont to invade the whole body and we recognise it through the ulcers which ulcerate the genital organ, the anal region and the palate. But those which arise in the whole body are callous and sometimes have decay of the bones and sometimes grow into fistulas. In the treatment of these, besides the purging of the whole body and draughts we are accustomed to treat them in this manner; if fistulas are present we treat them as ulcerated fistulas; if callouses are present we turn to that cure which I have explained in the ablation of callouses. If indeed they are not cured by these methods, then we come to the treatment with precipitate and rose unguent and we are accustomed to put on it this medicament: rose unguent and we add a small portion of prepared precipitate used as a lotion or, if the ulcers are not healed by a precipitate of this kind, we come to an ointment which has mercury in it and this (is what) I use.

Rx pork fat, turpentine, lotae, of each 2 ounces;
fresh butter, white olibanum, of each 1 ounce
trituated mercury, $\frac{1}{2}$ ounce; a little wax.

Mix and the medicament is made.

"Now we treat the ulcer first by moistening it with aqueous alum. mag. diluted by large quantities of rose water. Afterwards we apply this medicament. To the exterior parts, however, (we apply) a large dressing soaked in simple linament, and I have always effected a cure by this means".

3.4.4 Commentary on Fallopio's Chapters

The person to whom the chapters were addressed was presumably the Archbishop of Panormus. Petro Agatho had dedicated the whole volume to him, probably in the same spirit as von Hutten had dedicated his work on the treatment of syphilis to the Archbishop of Mainz:

"not that I wish you to use them (the drugs) yourself but that they might be published against the needs of your court"⁸.

The artificial palate constructed to be held in position by gold chains to the nostrils was of an individual type. Agatho stated that the instruments were difficult to describe in words and certainly his description conveyed no clear indication of the detailed design. It can only be assumed that the chain was somehow hooked to the columella or ala of the nose. Fallopio's instrument was described and committed to paper at or before the time of the publication of those appliances described by Amatus and Pare. The originality of Fallopio's concept ensures that he was not plagiarising either of the others' work.

The medicaments described were similar in many respects to those recommended by Renner⁹. Sulphuric acid was used

to prevent the epithelialisation of the borders of the ulcer, whilst astringents drew these borders together. Unguents mollified the discomfort caused by this harsh treatment. Fallopio worked from a broad base with his recipes, employing all the remedies for syphilis known at the time. Guaiac, or holy wood resin, had been recommended by Renner; the combination with myrrh and frankincense as astringents was to be featured again by Petroni¹⁰.

1. 'Fallopio' in Dictionnaire encyclopédique des sciences médicales (Paris, 1877), 5 ser., 100 vols., IV ser., I, 167-168.
2. 'Fallopio' in Jourdan, A.J.L. (editor) Biographie médicale (Paris, 1821), 7 vols., IV, 111-113.
3. Guérini, V. A history of dentistry from the most ancient times to the end of the eighteenth century (Philadelphia and New York, 1909), p. 177.
4. Christ, J. 'Geschichtliches zur Behandlung der Gaumendefecte'. Janus, 1901, 6, 531-451, 587-591.
5. See sections 1.2 and 1.5.
6. Leibowitz, J.O. 'Amatus Lusitanus and the obturator in cleft palates'. J. Hist. Med., 1958, 13, 492-503.
7. Fallopio, G. De morbo gallico, written down by Agatho, P.A. (Padua, 1564), 62-63.
8. Leibowitz (n.6), see p. 494.
9. See section 3.1.2.
10. See section 3.5.4.

3.5 ALESSANDRO TRAIANO PETRONI

(Alexander Trajanus Petronius - flourished 1534-1581)

3.5.1 Biography

The aggregation of hard fact concerning Petroni proved formidable. As a Papal physician his life was documented, but the writings were shrouded in an aura of myth.

Mandosio¹ recorded:

"Alexander Trajanus Petronius, an Italian, a noble doctor and philosopher from the City of Castella, who was so outstanding in the art of medicine that he had few equals and perhaps no one superior. By practising medicine with outstanding skill he abundantly won health for the sick, renown for himself, fame for his native land and wealth for his heirs.

"He established close acquaintance, indeed friendship, with the blessed Ignatius Loyola, and is written of in the life of the saint most elegantly expounded by Jo. Petrus Masseius, Book 3, chapters 7 and 14.

"When once Ignatius was grievously sick in his stomach, namely from excessive heat of the liver, he had been brought to so little hope of a cure that all believed his end was near. Therefore the elders took counsel and gave orders that Alexander Petronius should be summoned forthwith.

"When he examined Ignatius and perceived the nature (of the trouble) and the manner in which medicine had been improperly administered, with great indignation he openly denounced the ignorance of the previous doctor.

Administering medicines proper to the occasion, in a short time he restored the Holy Father to his previous good health.

"Once when Ignatius had come to visit Alexander when he was sick, although at a previous time, and having been admitted by servants because of their familiarity with him, he found the sick man lying quietly in his bed with the windows curtained. Thinking that the man was sleeping, creeping up quietly on tiptoe, he carefully sat by his pillow. Yet, nevertheless, Alexander was roused from sleep and suddenly calling to his wife, he asked what was this strange resplendence, what great light which filled the room.

"But she replied simply, as was the case, that Ignatius alone had entered.

"Then Alexander, a wise and grave man, recognising beyond any doubt the holiness of Ignatius, from that day looked upon him more and more as the lofty pinnacle of mankind.

"Petrus Castellus in his booklet 'Of the abuse of phlebotomia' page 95, calls Alexander 'a man of renown and one most well versed in the art of Medicine, the most outstanding doctor of Pope Gregory XIII', and in his 'Epistle concerning hellehore' page 4 'a most learned man and second to none in learning in his time'.

"Marsilius Cognatius in his 'Commentary on the health of the Roman atmosphere' says, 'Alexander Petronius, besides the other indications of genius by which

he merited the admiration of mankind, he held the foremost place amongst doctors in the esteem of all men'.

There followed a bibliography of the writings of Petroni, the earliest of which was "Propositions or medical aphorisms CXLIX" Venice, 1535. Of special interest was the entry: "'De morbo gallico', 7 books. There are extant two volumes of the work 'De morbo gallico' published at Venice by Jord. Zilett, 1566 in folio". Astruc² had a poor opinion of this work: ".... so redundant in words as to create a loathing". This reaction was a contrast to Mandosio's laudatory comments.

The biographical note by Eloy³ was evidently based on Mandosio. Eloy related the stories concerning Ignatius and noted that Petroni was physician to Gregory XIII, who died in 1585.

Marini⁴ castigated Mandosio for insufficient research into the Gregorian physicians and expressed some doubt as to whether Petronius was physician to Gregory XIII. Marini believed that Petroni was probably identical to Alessandro da Civita Castellana, who was one of the physicians to the household of Paul IV⁵. (Pope, 1555-1559). He went on to misquote from Eloy, stating that Petroni died in 1585 "which is perhaps true as he was very young when he practised medicine in the school of Padua in the year 1534 at which time publishing his 'Treatise on disease of the heart'"⁶. Marini concluded with the conjecture that Alessandro Petroni was probably descended from Alfonso Petroni who, in 1492, had been sent by Pope Alexander VI to preside at the fortress

of Castella.

Hahn⁷ wrote a short entry in which he stated that Petroni was physician to Gregory XIII. No dates were given for Petroni; the Pope's death was correctly stated as 1585. In copying this entry, Pagel⁸ also committed the error of transposing Gregory XIII's date of death to Petroni.

These references having been consulted, it was still not possible to give definitive dates for the life of Petroni.

3.5.2 References Made to Petroni's Obturator

Cullerier, writing in 1819, was the earliest contributor to point to Petronius' mention of an obturator⁹.

"The oldest author who, to my knowledge has made mention of it (i.e. the obturator), is Alexander Petronius, in his treatise 'De morbo gallico', printed in 1565. Perhaps there had been others before, but I have not found any of them".

de la Barre (1820) took up this reference:¹⁰

"Moreover, M. Cullerier who has written the article 'Obturateurs' in the 'Dictionnaire des sciences médicales' says that Petronius, who was alive in 1565 described the first of these appliances but he comments with justice that by the manner in which the author speaks of it, it was known before this time".

Snell (1824)¹¹ also repeated the 1565 origin of Petronius' description of palatal obturators, giving a full reference of "De margo gallico Chapter XIX p 1363". Of this information, the term margo may be attributed to

a typographical error, "Chapter XIX" proved to be correct, but the pagination remained a mystery.

Kingsley (1877)¹² stated that Alexander Petronius was the first to suggest "a piece of mechanism to act as a palatine obturator" a few years before Ambroise Paré's definite description of 1541. Kingsley then provided an English translation derived from Cullerier's French rendering of Petroni's comments, without however acknowledging his source. Kingsley was selective in the information he took from Cullerier. He adopted the text and the assertion that Petroni was first to describe a palatal stopper, but avoided any mention of 1565 to fit in with his own ideas of the chronology concerning Paré.

Platt (1947)¹³ chose to perpetuate another error:

"According to Segre, Petronius first attempted to solve the problem in the year 1530, by stuffing the perforation with wax, cotton wool or oakum, a loose fibre material which was obtained from hemp".

Oakum was not mentioned in the original text.

Most recently, Aramany (1971)¹⁴ mentioned Petronius on the authority of Kingsley¹² and Gariot¹⁵; he quoted the latter part of Kingsley's translation.

3.5.3 The Origin of Petroni's Reference to Obturators.

The earliest reference by Petroni, to palatal defects, was found in a 1567 folio edited by Luisini¹⁶. The folio consisted of a collection of essays and works on syphilis by various authors, divided into two tomes which were bound together. The first tome (tomus anterior) bore the date 1566 on the title page, the second tome (tomus posterior)

contained Petroni's writings and was dated 1567. Further investigation was not undertaken as the following section of Christ's paper came to light¹⁷:

"Aloysius Lusinus published the first large collected work on syphilis, 'De morbo gallico' at Venice in 1566; in two large volumes, we find the relevant essays of not less than 59 authors who had written about syphilis from 1493 up to that time, and indeed with all contributions except that of Petronius continuously paginated. Paré is not mentioned as he had made only occasional notes concerning syphilis in his books which had appeared up to that date. Among all the writings of the collected work, that of Aloysius Petronius is the most important as regards contents and by far the most detailed; it comprises 200 large folio sheets and has its own pagination. This last circumstance seems to me worthy of mention, because it supports the claim that this work of Petronius is published here for the first time; while it is not very probable, a priori at that time, that such a work should appear in a collection of already published works. Medical- biographical works all indicate the first year of printing as 1566 i.e. the year of Lusinus' 'De morbo gallico'; the fact is not taken into consideration that volume 2 of Lusinus, in which libri septem of Petronius is contained, did not appear until 1567. Pagel, for example (in the 'Biographisches Lexikon der Arzte aller Zeiten') gives 1566. Haller ('Bibliotheca medicinae practicae', tome 2, Berne 1777) seems to be of the opinion that Petronius had al-

ready published his work, but cannot bring anything in support of this assertion, above all no year of printing. Mangel ('Bibl. script. medic.' Geneva 1731) quotes Johann van der Linden ('De scriptis medicis' Amsterdam 1637) and according to this only knows of the appearance of the 'Libri septem de morbo gallico' in Lusinus' work of 1566 (1567). Direct enquiries to the libraries in Berlin (Königliche und Universitäts-bibliothek), Würzburg, Leipzig, Mainz, Wiesbaden, Göttingen, Munchen and Strassburg showed that only the last two universities possess any of the writings of Petronius, namely 'Bk II de morbo gallico' in the Lusinus edition. From all this the assumption is justified that this work appeared for the first time in 1567, in the collected works of Lusinus. An indication that Paré is preceded by Petronius in the history of the obturator is unjustified.

"Cullerier, a French doctor who, for preference, wrote about venereal diseases, is probably the originator of the false priority of Al. Petronius. In the 'Dictionnaire des sciences médicales' (Vol. 37, 1819) we find this assertion in the article 'Obturateur'. The inaccuracy of this can be seen at once, for Cullerier bases his proof on the fact that A. Paré did not publish the book in question till 1575 (actually 1561)".

3.5.4 Petroni's Chapter with Mention of Palatal Obturation¹⁶.

"Chapter 19. Of the Bone of the Palate which is removed or requires to be removed".

So far (I have spoken) of ulcerated bone which ought to be removed, but if the bone of the palate has gone or

requires to be removed, it demands particular care, for if it falls of its own accord or is removed by (surgical) skill, an impediment of the speech will follow, and, too, the nose will recede to create an ugly disfigurement of the man ('s appearance). For, as Hippocrates says, bk. 6, sect. 1., those who have the bony structure recede from the palate, have the middle part of the nose sink inwards.

"Therefore, if this bone falls away, (surgical) skill cannot reshape this disfigurement, and indeed, there can be an impediment of the speech; however, this is not always so, but sometimes, for instance, when an opening is formed in the palate, one may conveniently fill it with cotton, or wax or gold or with any other means, nearly approaching the shape of the natural curvature. If the aperture is filled with ingrowing flesh, neither the natural shape of the palate nor the breathing is changed, nor is the voice impeded; and the scar (tissue) should not be prevented (from forming) but it should be encouraged to heal by those remedies proper to the purpose which are known to all.

"But if the flesh grows beyond its proper bounds, it is necessary to take precautions that the scar (tissue) should not be allowed to form, otherwise the impediment may be recreated much worse (than before); therefore it is necessary to check the growth with oil of vitriol or with sulphur or with some other means of this kind. Then also, if it shrinks in such a way that the palate recedes from its normal form and becomes misshapen, it

is useful to employ some medicament for plugging the gap which may restore the palate to its normal size; for example that which is made from boiled guaracum resin, from myrrh or from frankincense, for this, when poured into the bone itself, has great power to regenerate fleshy tissue. So, too, if anything of a waxy nature is applied to the affected part, for example, (the following) which they described as being of a gummy nature:

Elemi

Amber, that which the Arabs term charabe of each $\frac{1}{2}$ ounce

Purified pine resin 1 ounce

Mastic

Frankincense of each 1 drachm

Beeswax and Common oil of each a sufficient quantity.

"Moreover it will seem proper sometimes to remove growing tissue by means of medicaments which erode it, sometimes to increase it when it diminishes with substances to plug it according to need.

"These, then, are the actions to be taken when the bone of the palate has gone; but if, indeed, it has not quite been eaten away, and yet it is not possible to prevent it being destroyed on account of the ulceration, there is nothing more excellent or effective than to burn away the palate; for when fire is applied beneath it, because all parts of the body, as we have mentioned previously, shrink away from it to a great extent when it burns, it will drive back the surrounding walls of

the palate above it, and because of the dryness which it causes, it will solidify it in such a way that the nose will not completely fall in; but efforts should be made to plug the resulting cavity, just as we have been advised, on account of the voice; and we should not hesitate to burn away the palate because it is spongy.

"For, too, Hippocrates 2 on diseases states that a tumour on the palate should be burned away. Now it seems of little importance whether it is decided to burn away the palate or other bones with red-hot iron or with tinder as the ancients did. I will not, however, omit what Hippocrates or some other ancient authority said in his book about the organs in man, that one should burn away fleshy tissue with iron, but bony or sinewy tissue with tinder".

3.5.5 Commentary on the Chapter

Petroni freely quoted from the ancient authority of Hippocrates, which was perhaps obligatory as a demonstration of his learning. His quotation indicated that the Greeks were aware of the effects of gross palatal ulceration, even if no attempt was made at prosthetic restoration.

Comparison of the *recipé* with that given by Fallopio three years previously¹⁸ revealed an inescapable similarity. The *précis* of materials used for palatal obturation was also reminiscent between the two writers. Whereas Petroni was eager to quote Hippocrates, he was less anxious to acknowledge a contemporary. Thus Fallopio was not mentioned by name: Petroni introduced a *recipé*, which could have originated from Fallopio, with the words "they describe".

This link between the two authors and the short period between their publications could be added to Christ's evidence for supposing that Petroni's writing first appeared in the 1566/7 folio edition.

There would seem to be a chain of awareness linking Fallopio, Petroni and Girolamo Fabricio. The link between Fallopio and Petroni has been demonstrated and Fabricio later referred to the use of "small irons" for cauterising the palate, as Petroni had done¹⁹.

1. Mandosio, P. *Θεστροφ* in quo maximorum....pontificum archiatros....exhibet (Rome, 1696), p.9. Reprinted in n.4.
2. Astruc, J. A treatise of the venereal disease, translated by Barrowby, W.(London, 1737), 2 vols., II, 325.
3. Eloy, N.F.J. Dictionnaire historique de la médecine (Mons, 1778), 4 vols., III, 532.
4. Marini, G.L. Degli archiatri pontificj (Rome, 1784), 2 vols., I, 454.
5. Paul IV, as a persecutor of the Jews, played a governing rôle in the later travels of Amatus Lusitanus: see section 3.2.1.
6. Marini (n.4), I, 455. (The treatise referred to could not be traced).
7. Hahn, L. in Dictionnaire encyclopédique des sciences médicales (Paris, 1864-1889), 5 ser., 100 vols., II ser., XXIII, 770.
8. Pagel, J. 'Petronius' in Biographisches Lexikon, 2nd ed. (Berlin and Vienna 1929-1934), 5 vols., IV, 573.
9. Cullerier, M.J.C. 'Obturateur' in Dictionnaire des sciences médicales (Paris, 1819), 60 vols., XXXVII, 59-67. (See p.60).
10. de la Barre, C.F. Traité de la partie mécanique de l'art du chirurgien dentiste (Paris, 1820), 2 vols., I, 299.
11. Snell, J. Observations on the history, use and construction of obturateurs, 2nd. ed. (London 1828), p.2.

12. Kingsley, N.W. 'Obturbators, ancient and modern'.
Johnstons dent. Misc., 1877, 4, see p.362.
13. Platt J.H. 'The history and principles of obturbator
design'. J. Speech Dis. 1947, 12, see p. 111.
14. Aramany, M.A. 'A history of prosthetic management
of cleft palate: Paré to Suersen'. Cleft Palate
J., 1971, 8, see p. 415.
15. Gariot, J.B. Traité des maladies de la bouche (Paris,
1804), p. 324.
16. Petronius, A.T. in Luisini, L., De morbo gallico
(Venice, 1566/67), 2 vols., II, tomus posterior, 213-
214.
17. Christ, J. 'Geschichtliches zur Behandlung der Gaumen-
defecte'. Janus, 1901, 6, see footnote on p. 539.
18. See section 3.4.3.
19. See sections 3.6.3 and 3.6.4.

3.6 GIROLAMO FABRIZIO

(Hieronimus Fabricus ab Aquapendente ?1533-1619)

3.6.1 Biography¹

Girolamo Fabrizio was born in Aquapendente, a township approximately halfway between Rome and Sienna, probably in the year 1533. When he was seventeen he began his studies in medicine at Padua, attending lectures by Fallopio. He remained associated with the medical faculty and in 1570 became Promotore. This appointment carried with it the commission to examine candidates presenting themselves for their qualifying examinations. His duties also included presiding over public anatomical dissections, according to the custom of the times.

These commitments were taken lightly, however, and his courses were delayed on slender pretexts. Whilst reluctant to teach, Fabrizio also strongly opposed others who set up private courses in anatomy in an attempt to remedy the defects of the students curriculum. Adelman has suggested that, apart from ill health and the machinations of local politics, Fabrizio was so taken up with his major research work on embryology that he regarded the anatomy courses as trivia.

The plates which Fabrizio prepared certainly represented the first significant advance in embryology since the times of Galen. The value of the work must have been recognised, as by 1600, Fabrizio has been appointed Professor Supraordinarius in Anatomy, to be followed in 1603 by a similar appointment in Surgery. Fabrizio retired

in 1615 and died four years later.

3.6.2. The Background of the Surgical Writings: Bibliography

The pattern of life which Fabrizio lead was in marked contrast to his contemporaries discussed in this work; the complete antithesis of Paré for example. The pre-eminence of Fabrizio as a research worker cannot be questioned. However, he was alone in his limited travel and association with one university and town throughout his professional life; this was unusual for the period and must have limited the scope of his surgical appreciation. For this reason it was not surprising to find that Fabrizio's comments on palatal defects and the obturator were couched in general terms. There was no account of personal experience in treating palatal defects and his contribution on the subject was a pale shadow of that made by his former master, Fallopio.

Fabrizio's surgical works appeared in two parts, "Pentateucho cheirurgicum" and "Operationes chirurgicae". The first (unauthorised) edition was in 1592 and the works were issued in folio at Padua in 1617². The volumes which were available for the present investigation were the 1620 (Latin) edition³ and 1670 (French) edition⁴.

3.6.3 Translation from the Latin Edition

"Chapter XXXV, Of Surgical Operations of the Palate".

"Let there be surgery of the palate when the palate is missing because it is eaten away; which may befall either from the first day of birth when infants are born without a palate, who, not being strong enough to suck milk, they finally die as I have seen myself: or a part of the palate is lacking after birth because the under-

lying bone crumbles on account of the erosion; this condition distorts the power of speech, and (the sufferers) bring back both food and drink for the most part through the nostrils.

"This is a condition, too, which is not uncommonly associated with the Gallic disease and follows upon it. It is corrected by sponge or cotton or with a silver plate which may be affixed to the palate so that it may block up the opening.

"There is another (type of) surgery of the palate when we burn the bone which is laid bare with small iron implements so that decay may not proceed further".

3.6.4 Translation from the French Edition

"Some operations of the Palate".

"The palate is operated upon when it becomes deficient because of erosion; acquired or at birth. When infants are born without a palate, they are unable to suckle milk, starving at last, as I have seen. Alternatively, when some portion of the palate is lost after they have been born because it is eroded through and through, the bone which is beneath is reached. This indisposition prejudices speech and the disease makes the food and drink regurgitate through the nose. This is a misfortune which most often accompanies the pox. One corrects this imperfection with a sponge or some cotton, or a plate of silver hanging in the palate to close the defect.

"There is also another operation for the palate, when we cauterise the bone which is exposed with slender irons, for fear of the caries encroaching further".

3.6.5 Comment on the Text

From Fabrizio's text it seems reasonable to suppose that he derived his suggestions for obturation from the writings of others. Had Fabrizio made or designed an obturator himself, he would surely have provided greater details of the appliance.

From a comparison of the translations from Latin and French, the translation from Latin to French was a faithful one. It would not be unreasonable for the French translator to prefer the term "pox" to "Gallic disease" for syphilis. The naming of the disease was a form of international abuse, varying according to the nationality of the writer and the politics of the moment. Thus further synonyms were "the Spanish disease" and "the English disease".

Despite its brevity, Fabrizio's text demonstrated points of contrast with those others discussed in previous sections. Fabrizio favoured thermal to chemical cautery and did not feel it necessary to advise on the use of ameliorating unguents after these insults to the tissue. The discernment between congenital and acquired palate lesions was a unique feature of Fabrizio's description. One could not be sure, however, that the probable difference in aetiology was appreciated.

1. The biographical notes are based on information given by Adelman, H.B. The embryological treatise of Hieronymus Fabricius of Aquapendente (Ithaca, New York, 1942), 6-22.
2. Adelman (n.1), p.27.
3. Hieronymi Fabricii ab Aquapendente. Opera chirurgica (Frankfurt, 1620), p.127.
4. Hierosme Fabrice. Oeuvres chirurgicales (Lyon, 1670), 600-601.

3.7 JACQUE GUILLEMEAU (1550-1613)

3.7.1 Introduction

Guillemeau made no contribution to the development of the palatal obturator. In his work, "La chirurgie françoise....." published in 1594, he reproduced figures of Paré's turnbuckle type of appliance which were annotated on the facing page¹. No detailed reference to its surgical use was made in the body of the text however.

Nevertheless, Guillemeau figured in the story of the obturator on two counts:

- i Through his relationship with Paré.
- ii Because of the interpretations which have been placed on a controversial phrase included in his obturator annotations.

3.7.2 Biography and Relationship with Paré

Bayle and Thillaye² and Bégin³ were agreed that Guillemeau was born in Orleans in 1550. The former biographers claimed that the surgeon died in the middle of his work, covered with glory and honour, in Paris, during March 1612. He was buried at the church of Saint Jean-en-Grève and Bayle and Thillaye quoted the sonnet from his tomb. Bégin was less graphic but gave the date of death as 13th March 1613. This latter date became the more widely accepted.

Bayle and Thillaye also mentioned that Guillemeau was a disciple of Paré and published a translation of the latter's work in Latin. Bégin added that Guillemeau accompanied Paré on almost all of his campaigns; that he was placed by Henri III with the Duke of Mansfield whom he

served for four years in Flanders, that he was a surgeon at l'Hôtel Dieu de Paris and surgeon-in-ordinary to Charles IX, Henri III and Henri IV. Doe⁴ concurred with the royal appointments and stated that Guillemeau lived eight years in Paré's house.

Guillemeau's rôle in the translation of Paré's work has already been briefly evaluated in a preceding section⁵. If, indeed, he was versed in Latin, was sufficiently well connected to become a pupil of Paré at the height of his master's fame and had risen to become a surgeon to Charles IX so expeditiously - even allowing for Paré's influence - we may infer that Guillemeau's origins were not as humble as those of Paré.

The evidence is against Bégin's statement that Guillemeau accompanied Paré on almost all of his campaigns, as Paré had completed eleven before his future pupil was eight years old. Doe does not give the chronology of the eight years Guillemeau spent with Paré. The former would have been too young to join Paré before he set off with Charles IX on his grand tour of France (March 1564 - December 1565. See figure 5). Besides, the youthful Guillemeau had still to learn "the sage and wise precepts..... at the school of Courtin and of Riolan"², the anatomists, before joining Paré as pupil and assistant.

We are thus left with the remarkable prospect of Guillemeau completing his anatomy course, developing his surgical skills under Paré's guidance and becoming an established surgeon-in-ordinary, during the nine years between the end of the king's tour and his death in 1574. Both

the king and Guillemeau would have been aged twenty-four at that date.

Paré's approbation of his former pupil was brought to light again in 1938 with the publication of a sonnet and a poem written by Paré in praise of Guillemeau⁶. The former item originally appeared in Guillemeau's "Traité des maladies de l'oeil", Paris 1585, and the latter in his "Tables anatomique", Paris 1586.

3.7.3 The Obturator Illustrations and Annotations

The first (1594) appearance of Guillemeau's obturator engraving was mentioned above¹. The work in which it appeared was subsequently published in a Dutch edition and in 1657 was translated "out of the Dutch into Englishe"⁷. Germain Courtin collected the works of Guillemeau and published them as "Oeuvres de chirurgie de J. Guillemeau" in Paris, 1598 and 1612; a later edition appeared in Rouen, 1649³. The obturator reference was confirmed in the following:

La chirurgie françoise....., Paris 1594¹

The french chirurgerye....., Dordredt, 1597⁷

Les oeuvres de chirurgie....., Paris, 1612⁸

Figure 8 was taken from the 1612 edition, but Guillemeau's annotation on the facing page was identical to that in the earlier work of 1594.

A translation of the original French may be rendered: cccc "Artificial palate of gold, which is a strong plate as thin as an écu⁹, in Latin, Palatum; it is made to close the palatal void so that one does not speak through the nose.

"Some are not able to be conveniently helped by this plate, the most frequent fault is that the workman has not made it quite correctly, that it touches all parts of the vault of the palate, so that they use a little tent made of lint, or more generally sponge and they have several of them in reserve with them, so that if one falls they may instantaneously replace it with another, otherwise they will speak through the nose, and Renaut, as one says vulgarly:

d. "Shows the side which is next to the tongue.

e. "A small plate which twists and holds a larger plate, which is on the other side, which is placed in the hole in the palate marked by 'h' in such a way that it is suspended: Some of the Greeks name this instrument Hyperoe (aucuns des Grecs nomment c'est instrument, Hyperoe).

f. "The extremity of the plate which is marked on the second plate by 'h' which is placed in the hole in the palate.

g. "The face of the plate which touches against the palate, being to that extent laid against the aforesaid.

h. "The little plate which turns and twists and is placed in the hole in the palate".

In the English translation from the Dutch, the annotation was rendered thus:

cccc "An artificiaelle goulden roofe of the mouthe, which is a goulde plate, as thinn as a frenche crowne, L. Palatum, it is composede, to retayne therwith the

breathe, from the rooffe of the mouthe, therbye to evite the speaking through the nose. There are some which cannot verye well suffice theselves with this plate, by reason that the gould smithe cannot soe conveniently make the same that it aequallye of all sydes doe touche the Pallate of the mouth, so that instead, thereofe they use, a tente made of linte, or of sponge, to the which intente there are divers which are providede of them, because that if the one fell out, they in continentlye have another in readiness and preparatiōe to put therein because otherwyse they shoulde speake throughe the nose.

d. "Demonstrateth that syde which must lye next to the tunge.

e. "A little plate, wherewith the great plate is fastenede which is on the other side, which is thruste into the

h. "Hole of the rooffe, noted with h, to this end that it there might as it weare suspende: There are some of the Greeckes which call this instrument Hyperoe.

f. "The extremity of the sayed Plate, which in the seconde plate is noted with h, which is thruste into the hole of the rooffe of the mouth.

g. "The superior planitude of the Plate which, sticketh faste to the mouthe, as if it were glued thereon.

h. "The little plate which is turneded upsyde downe and thruste into the hole of the roof."

The plate in this edition was arranged as a mirror image to that found in the French editions; the engraver

had also omitted the letters 'd' and 'e', although the annotation continued to refer to them.

3.7.4 Guillemeau's Reference to the Greeks

The passage in these brief notes which, according to Rogers¹⁰, "has caused medical historians much grief" was that which implied that the Greeks knew of the obturator and called it Hyperoe. Rogers continued:

"A careful and exhaustive scrutiny of the Greco-Roman literature, however, fails to uncover these unknown Greeks, perhaps known only to the imagination of Guillemeau".

de la Barre had earlier read even more into the passage:

"According to Guillemeau, it would seem that the Greek physicians had occasion to use this type of appliance".

This was taken up by le Foulon¹².

Previous medical historians might have been saved some of their grief had they examined Guillemeau's writings more closely. The plate in which he illustrated the obturator also carried the likeness of other instruments employed in the surgery of the mouth, false teeth and a speculum for the womb. Each instrument was described in French and given a Latin and a Greek name. The classic tongues were in general use at the time for the communication of medical knowledge, hence the importance of providing classical terminology for the instruments. This was not to say that the ancients knew and used all the instruments for which Guillemeau provided classical nomenclature - nor did Guillemeau wish to imply this. The title page of the English translation specifically

stated that new found instruments were included, although this was not mentioned in the original French.

Christ¹³, writing in 1901 promulgated a related argument: his voice has, however, remained largely unheeded:

"Guillemeau gives tables, in which the surgical instruments and apparatus of his time are represented and to these are added quite brief explanations and descriptions. We find an illustration of a palatal obturator which corresponds exactly to Paré's cuff-link obturator, and to this is added:

'cccc artificial gold plate, which is a plate as thin as an éscu in Latin palatum.....'. After a longish break of a more general nature the description continues:

'd.....e a little plate which is bent and holds a larger plate which is on the other side, and which is placed in the hole in the palate, marked h, in such a way as to be suspended; some Greeks call this instrument Hyperoe'.

This is the passage according to which it has been concluded that Guillemeau asserts the Greeks knew of artificial palatal obturators. A closer examination of this quotation must however convince us of the baselessness of this assertion. The words 'this instrument' clearly do not refer to the small part (a) of the whole obturator 'a little plate' although they are separated from this sentence by faulty punctuation, but to 'this instrument' referring to the main clause 'artificial gold plate... in Latin palatum'. Also the assumption would be absurd that G. should quote a Greek name for a small unimportant part of the apparatus, while he does not do the

same for the other parts, or the whole thing. The designation Hyperoe would not be suitable for the part (a) which forms that part of the obturator lying towards the nose, for Hyperoe means 'palate'. If the sentence is put together, with the passage 'some Greeks call this instrument Hyperoe' immediately after the main clause, to which it obviously belongs, then the meaning is quite clear, i.e. the palate which is called palatum in Latin is called Hyperoe by some Greeks and as a result an artificial palate would be called Hyperoe in Greek. It says 'some Greeks' for there were other names for the palate besides the usual Hyperoe. If the sentence is not understood in this sense, we might just as easily assert that the Romans were acquainted with Paré's cuff-link obturator, as G. says the Latin expression for it would be palatum.

"In addition, we have searched through a whole series of passages in Greek literature in which the word Hyperoe occurs, in Homer, Aristotle, Plutarch, Galen, etc; there is no mention anywhere of artificial palate".

Snell¹⁴ had earlier made this point in a more succinct manner. Having searched the Greek literature, he stated:

"We find the term Hyperoe used to express the palate, but not any artificial supply of that organ when defective".

3.7.5 A Further Source of Error Concerning Guillemeau's Writings

Snell also mentioned that Guillemeau had repeated Paré's last instrument^{7, 5}. The reference cited was the late edition of Guillemeau's works (1649) and he was

misconferred with the Christian name of "Isaac". These associated errors were readily incorporated in the literature, the most recent to perpetuate them was Aramany¹⁶; he was not, however, totally unquestioning:

"Isaac Guillemeau (1649), one of Paré's students, published his 'De Ouvres' which included a drawing of Paré's last appliance with no improvements. Kingsley was in disagreement regarding Guillemeau's first name and the date of publication. He called him Jacques and set the date at 1591. Guillemeau criticised the fitness of such 'instruments' however".

3.7.6 Guillemeau and Peter Lowe

The Scotsman, Peter Lowe (1550-1610) was an exact contemporary of Guillemeau. Lowe claimed to have followed the French King (Henri IV) in the wars for 6 years. Archbold¹⁷ pointed out that there was no mention of this in the French archives and therefore Lowe's appointment must have been of an honorary nature.

Lowe wrote one of the earliest original texts on the "whole art of chyrurgerie" in the English language; his "Discourse" was published in London in 1597¹⁸. As a member of Henri IV's camp, Lowe was bound to have an intimate knowledge of Guillemeau's work and methods. It was therefore of interest to see whether the Scot incorporated the Paré/Guillemeau obturator in his book.

A search of the volume revealed a brief mention of a case history¹⁹, but no device for remedying the defect:

"It happeneth to me at Paris to have a Chanon of Saint Anton, who had a certainedisease in his mouth,

by which he lost the pallet of his mouth, whereby he became dum, and y drinke which he ever dranke, he did avoide the most part of it at his nose".

All the plates for Lowe's work were derived from the volumes of Paré and Guillemeau: Finlayson provided a table showing the respective origins²⁰. The illustrations of hare lip and dental instruments were used by Lowe, but not that of an obturator. Of greater curiosity was an omission by Lowe of any mention of Guillemeau's name, although a number of surgeons were acknowledged for their help in the preparation of the work.

1. Guillemeau, J. La chirurgie françoise recueillie des anciens médecines et chirugiens (Paris, 1594), 18-19.
2. Bayle, A.L. and Thillaye, A.J. Biographie médicale par ordre chronologique (Paris, 1855), 2 vols., I 309-310.
3. Bégin, L.J. 'Guillemeau' in Jourdain, A.J.L. (editor) Biographie médicale (Paris, 1821), 7 vols., IV, 549-550.
4. Doe, J. A bibliography of the works of Ambroise Paré (Chicago, 1937), p.157.
5. See section 3.3.4.
6. Paré, A. Á Jacque Guillemeau Sonnet et poem. Hippocrate, 1938, 6, 509-512.
7. Guillemeau, J. The frenche chirurgerye.....translated out of Dutch into Englishe by A.M. (Dordredt, 1597), the plates and notations are on unnumbered pages.
8. Guillemeau, J. Les oeuvres de chirurgie 2nd. ed. (Paris, 1612), 502-503.
9. An écu of the time was 0.5mm thick: see section 3.3.6.
10. Rogers, B.O. 'Palate surgery prior to von Graefe's pioneering staphylorrhaphy (1816).....' Plast. reconst. Surg., 1967, 39, 1-19. (See p.11).
11. de la Barre, C.F. Traité de la partie mecanique de l'art du chirurgien dentiste (Paris, 1820), 2 vols., I, 298.
12. le Foulon, J. Nouveau traité theorique et pratique de l'art du dentiste (Paris, 1841), p.439.

13. Christ, J. 'Geschichtliches zur Behandlung der Gaumendefecte'. Janus, 1901, 6, 531-541, 587-591.
See latter section of this article.
14. Snell, J. Observations on the history, use and construction of obturateurs, 2nd. ed. (London, 1828), p.5.
15. Ibid. p.4.
16. Aramany, M.A. 'A history of prosthetic management of cleft palate: Paré to Suersen'. Cleft Palate J., 1971, 8, 415-430. (See p.117).
17. Archbold, W.A.J. 'Peter Lowe' in Dictionary of National Biography (London, 1909), 22 vols., XII, 196.
18. Lowe, P. A discourse on the whole art of chyrurgerie. The first edition (London, 1597) is a rarity: the second edition (London, 1612) was consulted.
19. Lowe (n.18), pps. 207-208.
20. Finlayson, J. Account of the life and works of Maister Peter Lowe (Glasgow, 1899), p.34.

3.8 JACQUES HOULLIER

(Jacobus Hollerius Stempanus, flourished 1536-1562)

3.8.1 Biography and Publications

Jacques Houllier does not rank today as one of the better known figures of the medical renaissance. In his own time, however, he was a prominent teacher, noted both as a physician and surgeon.

Biographical notes were provided by Jourdan in "Biographie médicale"¹. Albertus wrote a series of romanticised contributions², taking Bayle and Thillaye³ as his source, whilst "Biographisches Lexikon"⁴ summarised previous references.

Houllier's date of birth is unknown, but may be surmised to have been in the second decade of the sixteenth century, for he studied medicine in Paris and graduated in 1536. Bayle and Thillaye's estimate of the year of birth as 1538 was not in agreement with other authorities. From the title page of Houllier's work "De morbis internis"⁵, where he was described as Jacobi Hollerii Stempani, it may be deduced that Houllier was born at Étampes.

Houllier maintained his link with the medical faculty in Paris, as it is known that he was teaching there in 1538. In addition, his scholarship and skill enable him to build a successful practice and live richly at a time when Pare was following his first campaigns as a military surgeon.

In 1543 a forty-seven page volume was published, "Claudi Galeni.....de remediis": the editor's name appeared as Domini Jacobi Houllerii. Use of the title

domini would seem to confirm his academic status at the time. Amongst his other work Hollerius was assisting his distinguished former teacher, Tagault, in the production of a surgical textbook. This volume, "De chirurgica institutione" was also published in Paris in 1543 and took the form of six libri. Following the five libri on the principles of surgery, there was a sixth on the subject of materia chirurgica, written by "J. Hollerio".

Houllier succeeded Tagault as principal of the Faculty in 1546. In his teaching he sought to return to Hippocratic principles and away from the Galeno-Arabic school which had pervaded the Dark Ages. This leaning was evidenced by two publications; a commentary on "Coaca praesagia" (a supposed work by Hippocrates) which appeared in folio under Houllier's name (1558) and a commentary on Houllier's on the Aphorisms, published posthumously and edited by Liebaudium (1582). The return to the Hippocratic school was incomplete, however, as Houllier continued to favour the medicinal remedies of Galen.

Albertus² asserted that Houllier did not publish during his life and that after his death in 1562, the publication of his work was suppressed by plagiaries. Only after valiant attempts by his son were Houllier's papers ordered and eventually published, clearing the father's name. The available evidence does not appear to support Albertus' interpretation. "De materia chirurgica" appeared in three editions during the author's life, and "De morbis internis" was first published in the year after his death. It is probable that parts of the latter work were dictated during the author's

final illness. "De morbis internis" appeared in eight editions before inclusion in the collected works, "Omnia opera practica" (Paris 1612). Amongst the editors of Houllier's work, the names of Duret and Valet appeared most consistently. Duret was a pupil of Houllier and progressively embellished subsequent editions of his master's work with his own comments. On every title page, however, principle credit was given to Houllier and no allusion was made to a son of the author.

3.8.2 Houllier's Reference to Palatal Obturation

Snell⁶ mentioned Houllier's activity in the prosthetic field:

"In 1552, Hollerius in his 'Observ. ad Calcem de Morbis Internis', after giving some few remarks upon the subject, proposes to stop the apertures with wax or sponge".

If Snell's assertion was correct, Houllier's mention of a palatal stopper would have preceded Renner's reference of 1557⁷ and become the earliest published account. However, Snell's quotation was inaccurate in naming the work referred to, vague concerning the substance of the quote and lacked a precise reference. These were not typical features of Snell's writing; he frequently provided references down to the page number, giving verbatim quotations. There was thus reason to suspect the accuracy of his statement in this instance.

As previously mentioned, "De morbis internis" first appeared in 1562; the only work by Hollerius published in 1552 was the third edition of "De materia chirurgica".

No mention of the palatal obturator could be found in this

latter volume and Leibowitz⁸ confirmed that details were not published during Houllier's lifetime.

Dorrance⁹ and Rogers¹⁰ both made reference to Gurlt¹¹, who gave a partial quotation from Houllier on the subject of palatal suture and obturation. The quotation was in latin and the source was given as "Singulares aliquot observations, liber I. de morbis internis".

Consultation of this source revealed a collection of observations which had presumably been gleaned from papers brought to light after Houllier's death. This inference was made following a search of the available editions of "De morbis internis" housed in the British Museum, Wellcome Institute, and The Royal Society of Medicine. "Singulares aliquot observations" was not found in an edition prior to 1611.

The observation relevant to the present discussion was number four¹². Dorrance gave a translation of Gurlt's quotation, whilst Rogers presented a more complete interpretation "from the latin of 1552". The reference which Rogers gave for the origin of this 1552 latin was, however, the 1623 edition of Houllier's collected works.

Rogers' translation read thus:

"In some (persons) the soft palate, as the result of a corrosive discharge, is perforated at the root of the tongue. The body should be purged (the patient) bled and a gargle of guaiac and milk decoction prescribed, with local applications of aqua alchymistarum made of gall nuts, malicoria and rose (water). *It is then advisable to take a very long needle, curved at it's end

and perforated at its sharp point, by means of which a thread of waxed silk can be brought to the place requiring stitching: it should be mentioned that if the first union of the wound edges tears apart, it can be once again resutured. If in consequence of this treatment a complete integrity (of the palate) has not been achieved, then the region can be occluded with wax or a sponge and the patient can thereafter live comfortably".

3.8.3 Discussion of Houllier's Description

The original latin, commencing at the asterisk marked on Rogers' translation read:

"Acus imperata bene larga, postrema parte incurua
et sub mirconem perforata, qua filium suendo loco
traduceretur e. filo sericio cerato:"

That which Rogers rendered: "It is then advisable to take a very long needle.....," Dorrance preferred "A very long needle has been advised.....". Both authors acknowledged that Houllier was some 250 years ahead of his time to advise palatal suture. If Rogers' translation was correct, Houllier may have suggested palatal suturing as an original contribution: if Dorrance's translation was to be preferred, the inference would be that palatal suture was known, if not generally practised, previous to Houllier's writing.

The interpretation hinges on the precise implication of the past participle imperata, since there was no finite verb with it, est would be supplied normally. Imperata est would mean, strictly speaking, "has been commanded" or "has been enjoined". The past participle was, however,

commonly used to imply the present tense when employed alone. Because of the inexactness of the Latin, either complexion, that of Dorrance or that of Rogers, might be assumed correct.

This lack of precision which Latin conferred on descriptive texts also invites the questioning of what Houllier was really describing.

Rogers was convinced that the problem was one of syphilitic ulceration. His evidence was the prescription of guaiac, an established medicament for the affliction. He also tacitly accepted that the perforation was sited in the soft palate, as understood in the twentieth century. However, from the original description, it might be surmised that the perforation occurred low in the tonsillar fossa, between palato-glossus and palato-pharyngeus muscles. Inflammation of the uvula was frequently associated with inflammation in the lateral pharyngeal space. Martindale¹³ confirmed that guaiac resin was used in instances of subacute and chronic inflammatory conditions other than syphilis (e.g. rheumatism) and especially when there was associated inflammation of the pharynx and tonsils.

It cannot be stated with confidence, therefore, that Houllier was describing a palatal obturator as would be recognised today. Other instances may be cited of his advising the occlusion of ulcer cavities elsewhere in the body - an example was found in "De materia chirurgica" liber III, caput I ("of the use of materia in live bone"), where sponge and linen-stuff were recommended.

It was concluded that Houllier recommended the occlusion of perforations and pathologically created cavities

from the surgical principle of obliterating dead space.

There was no idea of designing a special palatal prosthesis as his contemporaries Renner, Amatus or Paré had done.

3.8.4 Houllier and Paré

Houllier and Paré moved in different circles in Paris. Houllier, as a senior member of the faculty, would probably have had a lofty disdain for Paré and his methods, although not necessarily well versed in these.

It was chronologically possible for Houllier to have read Paré's 1561 publication containing details of the obturator¹⁴. It was unlikely that Houllier derived from Paré the notion of closing palatal perforations with sponge, as his own earlier writings demonstrated that he was familiar with the use of sponge to occlude cavities. There was no way of knowing when Houllier committed to paper his observation concerning palatal perforation, but in all probability it was before 1561. His writing would seem to indicate that he had practical experience of treating cases in the manner he described, and there would have been little time to do this between Paré's publication and Houllier's death during the ensuing year.

1. Jourdan, A.J.L. Biographie médicale (Paris, 1832), 7 vols., V, 295-296.
2. Albertus, -. 'Un médecin du XVI siècle'. Gaz. méd. Paris, 1889, ser. 7, tome 6, 229-231, 241-244, 265-268.
3. Bayle, A.L. and Thillaye, A.J. Biographie médicale par ordre chronologique (Paris, 1855), 2 vols., I, 301.
4. Pagel, J. 'Houllier' in Biographisches Lexikon 2nd. ed. (Berlin and Vienna, 1931), 5 vols., III, 310.
5. Hollerii, J. De morbis internis, 7th. ed. (Paris, 1611).
6. Snell, J. Observations on the history, use and construction of obturateurs, 2nd. ed. (London, 1828), p.2.
7. See section 3.1.2.
8. Leibowitz, J.O. 'Amatus Lusitanus and the obturator in cleft palates'. J. Hist. Med., 1958, 13, 492-503.
9. Dorrance, G.M. The operative story of cleft palate (Philadelphia, 1933), p.2.
10. Rogers, B.O. 'Palate surgery prior to von Graefe's pioneering staphylorrhaphy.....' Plast. reconstr. Surg., 1967, 39, 1-19.
11. Gurlt, E. Geschichte der chirurgie (Berlin, 1898), 3 vols., II, 673.
12. Hollerii (n.5), p.704.
13. Martindale, W. The extra pharmacopoeia (London, 1958), 2 vols., I, 514.
14. Paré, A. La méthode curative des playes et fractures de la teste humaine (Paris, 1561), 261-262.

3.9 WILHELM FABRY von HILDEN (Fabricus Hildanus 1560-1634)

3.9.1 Biography ¹

Fabricus Hildanus apparently had an insatiable appetite for travel. His journeys were not derived from persecution, as those of Amatus had been, or due entirely to his duties as a royal or military surgeon, as in Paré's case. Of all the sixteenth century surgeons discussed in this work, Fabry von Hilden was probably the best acquainted with the philosophy and techniques of his European contemporaries.

Wilhelm Fabry von Hilden was born in the smithy at Hilden on 25th June, 1560². He was sent to the High School in Cologne, where he proved to be a talented linguist, but was forced to leave at the age of 13 years. The circumstances were a combination of the effects of war on the Lower Rhine districts and the death of his father. Fabry received no higher education and at 15 years was apprenticed to a surgeon in Neuss. Five years later (1580) he became the assistant to Cosmos Slotanus, surgeon to the Duke of Cleve in Dusseldorf. Reinerus Soleander was physician to the Duke at that time and it was probably from this source that Fabry learned the value of case histories: these later became a feature of Fabry's writing.

After the death of Slotan in 1585, Fabry started on his journeys. The earlier ones, during which he would have accumulated much of his experience and consolidated his reputation, included:

- 1585. Metz (France). 33 years after Paré's visit here, Fabry was assistant to a wound surgeon, Johann Bartisch.
- 1586. Geneva, Associated with Johann Griffen and practised his surgery on cadavers.
- 1587. Married Marie Colinet, also a surgeon, in Geneva.
- 1588. Returned to Hilden.
- 1591. Cologne. Fabry was resident there when his first book "De gangroena et sphacelo" was published in 1593.
- 1595. Geneva.
- 1598. Cologne.
- 1600. Lausanne.
- 1602-11. Payerne (Peterlingen) in the Vaud Canton, Switzerland.
- 1611-12. Hilden, at the time of his mother's death.
- 1612. Lausanne.
- 1613. Whilst staying in Worms, Fabry was recalled to Lausanne to deal with an outbreak of plague.
- 1614. Breisgau.
- 1615. Fabry was made a citizen of Berne. He continued to travel in France and Switzerland, despite his gout, but by this time his reputation was firmly established and Berne became his adopted town. Fabry died in Berne on 14th February, 1634, as the result of an asthmatic attack.

The contributor on Fabry's life in "Biographie médicale"³ was of the opinion that Fabry was for Germany what Paré was for France: the statement was modified by the

criticism (inter alia) that Fabry had too great a love of "instruments and machines". A less partisan writer could well raise that charge against Paré. Robinson⁴ dismissed Fabry (along with other contemporaries such as Scultetus, van Solingen and Wiseman) as "of importance though hardly epoch-making".

3.9.2 Bibliography

From 1593, Fabry published on topics such as gangrene, wound surgery, instruments and anatomy.

Perhaps his most significant contribution was the publication of six centuriae of case histories. These were frequently presented in letter form and were extremely detailed accounts of treatments which Fabry had administered. By comparison, they were more closely recounted than the centuriae of Amatus.

The centuriae were published as follows:

- I. Basle 1606
- II. Geneva 1611
- III. Basle 1614
- IV. Basle 1619
- V. Frankfurt 1627.

These five centuriae were collected and published together in Lyons, 1641⁵.

"Biographie médicale"³ and "Biographisches Lexikon"⁶ referred to the sixth centuria appearing for the first time in the collected edition of 1641. This quarto volume was consulted at the Wellcome Institute, London. It consisted of two tomes bound in one volume; the first tome included centuriae I - III, the second tome contained IV and V: each was separately indexed. The earliest publi-

cation of the sixth centuria which could be traced was in the 1646 edition of the collected works⁷.

Reference to the treatment of the patient with the palatal ulcer was found in the second centuria⁸.

The case history was also traced in the "Opera", Frankfurt, 1646⁹ and Geneva, 1682¹⁰. The text was identical, but the illustrations had been re-cut.

3.9.3 Translation of the Case History

"Observation XXII"

"Concerning ozaena, most serious with erosion of the palate".

"The most famous and learned man D. Emmanuel Urstisius, Master of the Liberal Arts, to whom Guil.Fab. Hildanus sends his heartiest greetings.

"O, most learned and dearest D. Urstisius, when I determined to commit to writing this history of a most serious case of ozaena, it seemed fit that I should dedicate it to you, and that, indeed, for two reasons. Firstly, although you saw the success of the treatment of this infection in part, and, indeed, you are now an eye-witness of the cure, yet, because you were sometimes not present, I wished to communicate to you the whole process (eager as you are to know of these treatments). Then, too, so that there should be in this centuria some testimony of our mutual friendship and close relationship. So I shall explain the matter in order.

"Laurentius Toupinnus, a citizen of Staffia, a man of about 30 years of age was somewhat afflicted with catarrh from an early age, (as his parents often told

me), when, in the year 1605 he was seized with a severe discharge from the jaws : thence an inflammation with severe pains developed around the base of the uvula and then, at last, a deep ulceration.

"Having gone to Freibourg he was healed by a not unskilled physician. But, in the following year which was the seventh after the one thousand six hundredth, since he had broken off the regimen of life and neglected the use of medicaments, the catarrh began once more to flow from his mouth, but first from his nostrils. However, because there was no pain, he treated the matter as of no consequence and did not make use of my advice before a number of small pieces of cartilage were discharged from his nostrils.

"At last, about the beginning of May in the year 1607, he came to see me, and when I was examining his infection, I perceived that he was devoid of a uvula, just as you yourself were able to see at that time, for by then it was already quite eroded, and afterwards again, it was covered by a scab. Nevertheless, for a wonder, he was not affected in the articulation of his speech, as if no disease were present. Yet continuously an acrid and irritant fluid flowed from his head into his nostrils, which eroded the bone of his palate and the cavities of his nose.

"The nose was swollen in every part and moreover with violent pains.

"Therefore, so that I might divert the discharge of the humours to other parts, I initiated a very strict

course of diet and prescribed for him the following draught:

Rx Of the herbs Betony, Agrimony, Veronica, Dodder; of each half a handful.

Seeds of Anis and of leaves of Senna; of each 2 drachms.

to be boiled in water so that the syrup be reduced to 4 ounces in which dissolve 1 drachm of our laxative powder:

Rose, syrup solution compos, with Agaric, Rhubarb and Senna, 1 ounce. Mix and make a draught.

"On the next day I cut a vein in his right arm, then at intervals I applied dry cupping glasses, as they now call them, to his shoulder blades, now indeed with scarification, and then injected with a syringe into his nostrils the following medicament and put it in also by inserting wire threads (filaments) into the same place:

Rx Ground seeds of Quince - 1 drachm

Water of Broom, Rose and Frogs Spawn; of each 2 ounces.

Let them remain infusing for several hours, preferably in a warm place. To the sticky extract add 2 ounces of rose honey, powdered Coral, burnt Stags Horn, Calamine; of all preparations 1 drachm. Mix.

"On the seventh day of that same month of May, for the better diversion of the catarrh, I applied a seton to the third vertebra of his neck. In order to drive away the discharges outside his nose and in order to strengthen the affected part, I applied some of the

following preparation:

Rx Of leaves and flowers of Betony, of Rosemary,
of red Roses, of Horsetail, of Broom, of flower
tips of Bramble, of Willow leaves; of each a
handful.

Let them be boiled in red wine to a third of the quantity
and a little vinegar added to the mixture. Pads of cloth
folded several times and soaked in this preparation are
to be applied and this to be repeated frequently. By
the use of this preparation the external swelling of the
nose gradually subsided.

"Now to the ulcer of the palate I applied the fol-
lowing liniment:

Rx Of roots of Angelica, of Birthwort, of Florentine
Iris, of Carisphyllatae, of Guaiacis Wood; of each
 $\frac{1}{2}$ ounce; of Cinnamon 2 drachms.

Mix, make a very fine powder, of which a little is to be
mixed in a glass jar with rose-honey and applied to the
ulcer of the palate with a brush. On the day after the
application of the seton I gave him a dose of my head
pills. On that day he excreted a small bone through his
mouth.

"On the 10th day of this said month, another bone,
large, ulcerated and noisome, emerged through his nos-
trils. Thereafter the ulcer in his palate increased
from day to day and also the cavity of his nose was eroded
as a consequence of which such a large cavity was left in
his nose that it was necessary to insert thirteen or even
fifteen plugs of the size and form illustrated here

(figure 9) one after another, steeped in the following ointment:

Rx Of Geranium juice, of juice of Solater, of Sempervivum, take equal parts: of Golden Litharge, of Burnt Lead, of Calamine Stone, of White Lead (ceruse) of each 2 drachms.

Let them be put into a mortar, on them pour a spoonful of oil of roses and after you have pounded it somewhat with a pestle, and have mixed everything properly, mix in a spoonful of the above-mentioned juices with which you pound and mix them again, and soon once more pour on a little of the oil and stir. And so, for some time do this, alternatively and continuously pounding and stirring until you have measured out 4 ounces of oil of roses and the same quantity of the aforesaid juices, so you will have an ointment most valuable against ulcers of this kind which are efficacious for anything malignant. The split of the nose from its top as far as the upper lip gradually eroded as a result of the very extensive putrescence which extended from the former spot as far as the latter; and indeed, it was not without very considerable pain so that it was scarcely possible to wipe the ulcerated upper lip with cotton (-wool) or with soft cloth (lit. threads).

"Now after I had for several days sprinkled powder of rectified precipitate on these small and painful little ulcers, the pain subsided and the size decreased somewhat. But, too, in the place of rose-honey, I mixed the afore-mentioned powdered angelica-root and birthwort

to the following syrup:

Rx Of Geranium juice, 1 pound; root of the Greater Figwort, 2 ounces; leaves and flowers of Betony, Agrimony, Veronica, Scabious, Functory, Wintergreen, Sanicle, Alchimilla, of each 2 handfuls.

Let the herbs and roots be boiled in water until one third is reduced, the preparation pressed through a strainer, add the syrup of best honey as written above, of sugar, of each 1 pound. Let the syrup be made according to your skill.

"In order also to alleviate the pain and the severity of the discharge which continued to flow, I prescribed the use of sour milk, which he began to use on the last day of May, continuing up to the 16th July, drinking one draught sweetened with sugar each morning three hours before the midday meal.

"However, although the malignancy and severity seemed to be somewhat abated by the use of these remedies, because the outcome was still in the balance, lest, if the cure was not very successful in accordance with our prayers, the blame should not fall entirely on me, I persuaded them to call in some skilled and learned physician. Accordingly, on the 11th July, the most illustrious and learned D. Sebastianus Meyer, Doctor of Medicine ordained for the State of Freibourg, was summoned. When he came to Paternicum and had gone into all the circumstances and the essence of the disease with me, with all the diligence he was able, he attributed the cause of the evil to a severe and erosive catarrh arising from some

affliction of the brain. Therefore it was agreed between us that the patient (although he had a great dislike of drugs) once again should be thoroughly purged and afterwards should employ a decoction of Guaiacum wood for a month or six weeks. Therefore I once again prescribed for him 1 drachm of our laxative powder, with a compound of 1 ounce of rose syrup. Then I also told him to use for four days some of the following decoction.

Rx Chicory root, Fennel, Parsley, Cress of each 1 ounce, polypod of Oak 2 ounces, stem and flower of Betony, Primrose, Scabious, Ceterach, Polytrichum, Dodder, Veronica, Agrimony; of each 1 handful. Fennel seeds, Anis; of each 2 drachms; Liquorice shreds and pulp of Grapes, of each 1 ounce.

Let them be boiled in water and reduced to a third so that when strained it returns to 2 pounds. Sweetened with some skimmed honey and water spiced with cinnamon, it should be employed in the morning to the quantity of 6 ounces. In the last dose infuse:

Of Senna leaves 3 drachms; of Rhubarb, 1 drachm; of Agaric. $1\frac{1}{2}$ drachms. To the extract add of rose syrup solution mixed with the Rhubarb, Agaric and Senna, 1 ounce.

When the body has been purged by this means, he began to use the following sweating concoction:

Rx Of Guaiacum wood 6 ounces, of the same bark 6 ounces, of pure Water, 8 pounds.

"Let them steep in a warm place for 24 hours. Afterwards let them be simmered on a low heat until reduced to

a half, strained and kept for use in a glass ampoule.

"To the residue of the same wood, once more pour in 8 pounds of water. Let them boil as before, and reduce to a third part. When this is prepared, it is to be used as a draught as usual.

"I dosed him with this first preparation, at first only once a day, especially in the morning, and I told him that he should sweat. Meanwhile I prescribed for him the proper kind of food. He used the latter draught for at least seven or eight days; for he was now afflicted himself to such an extent and his strength was so weakened that he did not dare to use it any longer. He used the second decoction for several weeks together with his food.

"And because the opening of his nose, and indeed the bone of his palate were to a great extent eaten away, I filled the whole cavity of his nose with plugs, soaked in the afore-mentioned ointment made from plant-juices as I have described above, by doing which, not only did the ointment adhere in all parts, but also the nose was maintained erect as far as could be.

"On the ulcer of the palate, moreover, I applied dressings soaked with the described syrup made from the roots of Scrophula, Betony, etc. with powdered Angelica root and Birthwort.

"I repeated all these things twice a day. When the dressings were extracted, before I put in fresh, I cleansed this whole cavity of the nose with the following medicament, injecting it with a syringe and also

with brushes dipped in it.

Rx Juice of Broom, of Geranium, of Water, of Frogs
Spawn, of each $\frac{1}{2}$ an ounce; of the described
syrup 1 ounce. Mix.

"When these remedies had been applied, the disorder ceased and the ulcers in the cavity of the nose were covered in a few days by a scab. But on the 21st July, when his father had fallen sick of a most grave illness, he went off to his family, taking with him the medicaments from me, and after his father's death he was compelled to look after his father's affairs. Meanwhile, when the great heat of the Dog Days began, because in consequence his blood became heated, so that it became more intemperate and diseased; then indeed, because the remedies which he had taken with him were applied less regularly, the disease began to increase again. As a result he once again needed to consult me.

"Then I perceived that the putrescence and affliction had once again increased; for there was a great smell present and the top of his nose was seen to be livid right up to the alae. Whereupon I again began the treatment thus.

"First his body was thoroughly purged. I cut a vein (although by the use of a seton many humours were extracted and flowed out) I applied cupping flasks to create greater diversion. Every day I carefully washed the ulcers everywhere in the cavity of his nose and around his palate with the prescribed medicament of Geranium juice and Frog's Spawn etc. and applied dressings soaked

in ointment from these juices as I have described previously. And because that putrescence which had affected the top of his nose was invading the neighbouring parts also, I was compelled to apply some of my Egyptian unguent not only to the top of his nose but also to the ulceration around his palate. So, by divine grace, the putrescence and decay gradually decreased, but the treatment was continued right up to the month of December on account of the quantity of decaying bony pieces which came from his nose as well as from his palate. I have kept up to 34 pieces of these bony materials. There also fell out several of his front teeth with the alveolar bone, so that a large hole was left penetrating from his mouth into the cavity of his nose. In order that the air should not be dispersed through this hole, and thus the voice and speech be made difficult, I had a certain instrument constructed from silver with sponge sewn on to it. (Figure 10).

"This instrument was able to close up the aforementioned hole of the palate so well that he was able to produce his speech as articulately as if no defect existed; when on the contrary this instrument with its spongy lining was taken out, he was hardly able to produce one or another word distinctly and clearly.

"There occurred also several other difficulties in connection with this affliction which made this treatment long and difficult, but because I know that they are not unknown to you, I omit here for the sake of brevity.

"Now, however, praise be to God, the sick man is so recovered that, to this very year, 1609, he has been in good health and has been able to keep careful charge of his family affairs in his own hands. However, the top of his nose, which had been corroded, has become strong.

"With you, interested in the treatment of this case were the most learned and famous men D. Mich. Dor.Dr. of Phil. and Med. my most cultured companion, likewise Melch. Schon. Student of Medicine, who when travelling to Paternicum, saw this patient in good health.

"Now farewell, most beloved Master Urstisius, and do not neglect to greet that most honoured Faculty of Medicine of Basle in my name. From my Museum 13th January, 1609".

3.9.4 Comment

The burden of the case history was taken up with accounts of medicaments applied systematically and locally in the treatment of ozaena. The writing might readily be taken for that of a physician rather than a surgeon, and, in this respect, contrasted to surgical works by others of the period. The first and more simple obturator was simply designed as a vehicle for the application of medicaments. With the exception of that containing lead, the medicaments locally applied were of a soothing unguent nature with little astringent effect. Perhaps this accounted for the sizeable enlargement of the palatal defect, which was in contrast to the effect of Renner's astringent recipes¹¹. Both surgeons recommended the use of guaiac, although the

diseases dealt with by each were ostensibly of a differing nature.

Fabry did not quote any authorities concerning the general treatment or provision of the obturator. The account of the restored speech gave no hint that Fabry regarded this as a new discovery. The inference must be that through his reading or wide travel, Fabry had become sufficiently familiar with the palatal obturator to regard it as common-place. It was surprising, therefore, that he had no name for this "certain instrument".

1. Jones, E. 'The life and works of Guilhemus Fabricius Hildanus'. Med. Hist., 1960, 4, 112-134. The majority of biographical data was taken from this source, except where indicated otherwise. Jones' basis of research was probably Biographisches Lexikon, see n.6.
2. Eloy, N.F.J. Dictionnaire historique de la médecine (Mons, 1778), 4 vols., II, 525.
3. 'Fabricius Hildanus' in Jourdan, A.J.L. (editor) Biographie médicale (Paris, 1821), 7 vols., IV, 90.
4. Robinson, V. Pathfinders in medicine, 2nd. ed. (New York, 1929), p.159.
5. Guilhelmi Fabricii Hildani, Observationum et curationum centuriae omnes (Lyons, 1641).
6. Kleinwachter, -. in Biographisches Lexikon, 2nd. ed. (Berlin and Vienna, 1930), 5 vols., II, 462.
7. Guilhelmi Fabricii Hildani, Opera, observationum et curationum (Frankfurt, 1646).
8. Fabricii (n.5) observatio XXII, 169-174.
9. Fabricii (n.7), 98-102.
10. Guilhelmi Fabricii Hildani, Opera observationum et curationum (Geneva, 1682), 98-102.

3.10 MANUEL ALVARES DE TAVORA

(Zacutus Lucitanus, 1575-1642)

3.10.1 Biography

The biographical details presented in this section were derived from contributions by Friedenwald¹ and Pelter².

Manuel Alvares de Tavora was born of a line of distinguished Jewish physicians and scholars at Lisbon in 1575. He studied medicine at Coimbra and Salamanca, as Amatus had before him³, taking his degree at the University of Siguenza, possibly in 1596. He practised successfully in Lisbon until 1627, when religious persecution forced him to move to Amsterdam; there he adopted the name descriptive of his origin, Zacutus Lusitanus.

Portugal was a Spanish Province during the period 1581-1640. The Inquisition reached its peak in the reign of Philip IV (1621-1665) and it was under these circumstances that Zacutus had been driven from the country. Jewish emigre communities had grown up in regions which had not been subject to Spanish expansion such as European Turkey. (The region toward which Amatus migrated, see figure 4). Alternatively, persecuted Jews fled to regions where the oppressions of the regime had been defeated. The protestant Northern Netherlands had become effectively independent by 1609, even though the State was not recognised until the Treaty of Westphalia in 1648. Amsterdam was developing as a cultural and medical centre and would have had much to offer a man of Zacutus' scholarship.

In Amsterdam, Zacutus was noted as a clinician with

a special interest in, and knowledge of, drugs. He had read Harvey on the subject of the circulation, but retained his Galenic principles. He performed autopsies at a time when these were rare; however, he was not alone in this as his contemporary in the city, Nicholas Tulp, was also an exponent.

3.10.2 Bibliography and Reference to Palatal Obturators

Zacutus' publications began in 1629 after his move to Amsterdam. His observations on the use of the palatal obturator demonstrated his familiarity with medical archives and the works of the great physicians; they also betrayed that his knowledge of the obturator was probably indirect. His comments on the subject were contained in "De praxi medica admiranda", first published in 1634; consideration was given to the subject of palatal ulcers in the 77th observation⁴. Zacutus acknowledged the work of many earlier writers whom he had used as his authorities. Amongst those listed in the preface to "De praxi.....", who had also mentioned the use of the palatal obturator, were Paré, Amatus, Fabrizio and Houllier. Fabry von Hilden and Tulp were also acknowledged, but these authors did not publish on the obturator until after Zacutus' own contribution.

3.10.3 Translation of the Text⁴.

"Of Ulcers of the Palate"

"A gap in the palate apart from one which has been caused by the Gallic malady, is sometimes filled up by Nature.

"It is not an unusual thing that a part of the palate falls in when eaten away by decay as a result of

a virulent disease, yet for it to be corroded by a severe dissolution, so that those who suffer speak less distinctly but more obscurely and more thickly, is uncommon.

"Since I have been contemplating the description of this observation, lo!, amongst other letters of most learned men, laid up according to custom in the Museum, I have read one belonging to the most illustrious Doctor Benedictus, most learned man of Hamburg from Castrum Medici, in which was written down an example which is neither well-known nor of common occurrence.

"A young man 18 years of age, sanguine by temperament, yet had a cold brain, and from his nostrils a mucous phlegm ran out in such quantity that he was forced to breathe with difficulty. One of his veins was cut, cupping-glasses were applied to his shoulder-blades, fluids were prepared and his body was purged many times. With the help of these things in time he was relieved of his flux, and once again his mouth, palate and tongue began to be restored sufficiently so that the gap in his palate decreased together with the terrible ulcers in his mouth which had arisen from a huge tumour on his tongue.

"His body was once again purged and drainage openings were made in his arm and the nape of his neck. His brain was strengthened with strong-smelling hoods and with absorbent pads. Sweating bathes made from Ebony were commanded; as a result of all these things the infection declined except a carious ulcer of the palate; since this was extensive, it could not be filled with a silver or gold

plate, a remedy which these authorities advise:- Paraeus bk.22 chap.3; Amatus bk.5 cent.14; Alexander Trajanus bk.7 chap.19, concerning the Gallic Disease; Fallop. concerning the same disease chap. 79 and others.

"It was attacked, therefore, with abstergents and sarcotics; but when everything had been tried without success - since the seed bearing parts, once destroyed, are rarely regenerated - Nature, who alone suffices for its own purposes, gradually surrounded and covered the ulcer with hard skin; this is a rare occurrence".

3.10.4 Commentary on the Text

Whereas Zacutus' contribution may have had some value as a "review of literature", the authoritative recipes for local treatment of the ulcer and graphic description of an obturator appliance were missing. These were to be found amongst the writings of those to whom Zacutus referred^{5,6}.

The rarity of complete natural closure of syphilitic perforations in the palate had been mentioned by many since Renner's observation⁷. Zacutus therefore had considerable authority to call on to support his own observation that the case he described was singular. The reference to "seed bearing parts" (partes spermaticae) could not be fully explained. In cases of venereal disease, ulceration of the palate and genitalia would commonly be found in association. In the passage given, mention of ulcerated genitalia would seem to be inconsequent; however, to over-liberalize the translation might confer a complexion on the original which was never intended.

1. Friedenwald, H. 'Zacutus Lusitanus (1575-1642)'.
Bull. Hist. Med., 1939, 7, 458-85. Reprinted in
the same author's work The jews and medicine
(Baltimore, 1944), 2 vols., I, 307-321.
2. Pelner, L. 'Abraham Zacutus Lusitanus (1575-1642)'.
N.Y. St. J. Med., 1970, 70, 446-448.
3. See section 3.2.1.
4. Zacuti Lusitani. De praxi medica admiranda libri
tres (Amsterdam, 1634), 62-63.
5. Petroni, see section 3.5.4.
6. Fallopio, See section 3.4.3.
7. See section 3.1.2.

3.11 NIKOLAAS TULP (1593-1674)

3.11.1 Biography

The information for this section was derived from the issue of "Medical Life" devoted to the life and work of Tulp and, in particular, Thyssen's contribution¹.

Nicholas Tulp was the son of an Amsterdam merchant, the youngest of four children. He started his medical studies in Leyden in 1611 and returned to Amsterdam as a practising physician on graduation. Tulp is probably best remembered as an anatomist; the ileo-caecal valve was named after him and he was immortalised by his friend Rembrandt as the instructor in his painting "The Anatomy Lesson" (1632). Tulp was the Praelector in Anatomy for Amsterdam during the period 1629-1653; attention was drawn previously to the ascendancy of Amsterdam as a centre of learning at this time².

The sense of civic duty which Tulp possessed was probably derived from his family's position within the community. The public appointments which Tulp held as an elder of the city included those of city counsellor, judge, keeper of orphans and city treasurer. He died in the Hague whilst there on civic business in 1674.

3.11.2 Bibliography

Tulp mentioned the use of an obturator in his work "Observationum medicarum". This publication was compiled for his son, Peter, who qualified in Leyden in 1637. Early editions in Latin, ran as follows:

Amsterdam, 1641. First published in three books.

- Amsterdam, 1652. Second edition which included a fourth book of 59 chapters.
- Amsterdam, 1672. Third edition, prefaced by a portrait of Tulp at 79 and a verse by his son-in-law, J. Six.
- Amsterdam, 1685. Fourth edition.
- Leyden, 1716. Fifth edition, with biography by Van der Zoort.

Translations were made into Holland Dutch and published in Amsterdam (1650) and Leyden (1740). Tulp was said to be so dismayed by the standard of the 1650 translation that he started upon his own. This was never published, but the script was still in a possession of a descendant of the Six family in 1929¹. Mention of the obturator was confirmed in the chapter dealing with palatal ulceration in the first³ and third⁴ editions of "Observationum medicarum".

3.11.3 Translation of Tulp's Text⁴.

"Chapter 37. Ulcers of the Palate"

"Ulcers of the palate affect either the bone or the flesh. While the former are incurable, yet the latter may be cured, with the greatest difficulty. We saw this very clearly in the case of Albertus Pistor. When a surgeon had healed for him a very extensive ulcer in the flesh of the palate, he - over confident man - ran away with the belief that all types of palatal ulcer, even when the bone had decayed, would yield to treatment by him, but since he had failed to discriminate accurately enough between the different types of these ulcers, his hopes were frustrated more than once, and he never reached

the goal at which he was aiming.

"For this ulcer was cured in the flesh ("muscle") of the palate; it remained incurable in the bone. And therefore there is no wonder if, in a part that is rounded and always moist, he had wasted his effort, although he used remedies which in other circumstances were suitable enough, such as solution of clear muriated mercury, with rose syrup. When this was applied to the eroded bones, a certain whitish foam broke out from them in that place. When this was wiped away a number of times, he then separated the decayed parts by means of oil of cinnamon with oil of corrosive sublimate. Indeed, I have not heard or read of anything more efficacious than this remedy for quickly dividing the bones. However, he was unable either to cause the flesh of the ulcer of the mouth to grow over the parts that had separated or to induce sufficient hard skin to grow from the wasted bones conveniently to close up with wide opening of the gap. But he found it necessary finally to have recourse to that plate of silver with sponge affixed which all authorities who have written about surgical matters say should be placed over ulcers of this kind".

3.11.4 Commentary on the Text

Comment on Tulp's Latin comes more readily than any remark upon the surgical content of this chapter. It can be understood why the 1650 translation into Holland Dutch met with difficulties, and perhaps altered the tenor of Tulp's argument in places, for the original Latin was notably

ambiguous and littered with redundant punctuation. It would seem that Tulp condoned the treatment of palatal ulceration by the local application of mercuric preparations; the rider was added that one should not expect the healing of perforations in the bony palate. An ambiguity lies in the role of Albertus Pistor (Albrecht Baecker) in the related incident. The original Latin runs:

"Vidimus id evidentissime in Pistore Alberto: cui amplissimum carnis ulcus, in palato, ubi sanasset chirurgus; credidit ilico, homo gloriosus, quaecunque palati ulcera etiam cum ossis caria, feliciter sibi cessura".

The use of cui construes the sentence in two ways. Either "a surgeon had cured an ulcer in the flesh of his (Albertus') palate", or "a surgeon had cured under his direction a palatal ulcer". The former complexion, taken in context, would infer that Albertus had had an ulcer cured in his own mouth and as a result thought he knew how to heal all palatal ulcers. The alternative view would be that Albertus believed that once he had shown a surgeon how to cure a palatal ulcer, that surgeon was competent to tackle any palatal ulcer. Of these two senses, the latter was preferred but the translation was left in ambiguity to mirror the original Latin.

In general format, the presentation of this short chapter was similar to that of Tulp's contemporary and fellow citizen, Zacutus⁵. Both relied on authority other than their own in their presentations, but Tulp paid more attention to local therapy of the lesion.

Jourdain⁶ mentioned that:

"Tulpius, Obs. Med. Lib. 1 relates that an obturator, having fallen into the throat, the individual died".

The origin of this observation by Jourdain could not be traced.

Snell⁷ wrote of Tulp:

"Nic. Tulpius in his Observat. Medici, published in 1685, Book 1 Chap. xxxviii p.70, among other information relative to diseases of the palate, quotes Pistorae Albertus, who considered that diseases of the os palati are incurable and those of the velum are cured with great difficulty. Tulpius says, with respect to instruments for the supply of defects of the palate, that 'In many cases it is requisite to have recourse to silver itself in these kind of apertures with sponge annexed, as authors on surgery mention'."

The translation given in section 3.11.3 indicates that it was Tulp who made the differing prognoses, cautioning against Albertus' view that all types of palatal ulceration were curable. A comparison of Snell's abstract with the original Latin demonstrated that his translations were more of a liberal than specific nature.

1. Thyssen, E.H.M. 'Nicholaas Tulp'. Translated by Scolten, A. Med. Life, 1929, 36, 394-442.
2. See section 3.10.1.
3. Tulp, Nicolai. Observationum medicarum (Amsterdam, 1641), 72-73.
4. Tulp, Nicolai. Observationes medicae editio nova (Amsterdam, 1672), 69-170.
5. See section 3.10.3.
6. Jourdain, A.L.L.B. Traité des maladies....de la bouche.....(Paris, 1778), 2 vols., I, 442.
7. Snell, J. Observations on the history, use and construction of obturateurs, 2nd. ed. (London, 1828), p.6.

3.12 FRANÇOIS THÉVENIN (d.1656)

3.12.1 Biography

It was not possible to glean any worthwhile biographical information within the scope of the present investigation. The standard bio-bibliographies provided sparse generalities concerning Thévenin's life and work. One source¹ indicated that the surgeon was born and died in Paris, that he was a distinguished lithotomist and oculist and that his writing did not correspond to the celebrity of his work during his life. From the title page of Thévenin's "Oeuvres..."² it is known that he was of the royal household and manifestly a surgeon of note.

3.12.2 Thévenin's Mention of the Palatal Obturator

"Oeuvres de Maistre F. Thévenin" was first published in 1658, after the author's death. Reference to the palatal obturator was found in the second edition of this work, in which there was a short chapter of just over one page entitled "Of prosthesis"³. Thevenin gave a classification of general prosthesis:

- i Limb or part thereof.
- ii Obturator.
- iii Embellishments - teeth, eyes, nose.
- iv Corsets and braces required to correct malformations.

Of the obturator he wrote:

"The second, to make better some operation or office; such as the instrument called the palatal obturator, to cover and close the hole which follows in this part by loss of a portion of bone caused by disease, or syphilitic

ulcers, which much aid the better to speak and swallow drink and eat".

It would seem unlikely that Thévenin himself would note down such general information. It is possible that Guillaume Parthon, who recounted the work, made a record of these headings during some discussion or lecture by Thévenin on the subject of prosthesis. The classification represents an admirable précis of those appliances which Paré had described in detail.

1. 'Thévenin' in Dezeimeris, Ollivier, -. and Raige-Delorme, -. 'Dictionnaire historique de la médecine ancienne et moderne (Paris, Brussels and London, 1831), 8 vols., II, 601-602.
2. Thévenin, F. Oeuvres de Maistre F. Thévenin recueillies par Guillaume Parthon, 2nd. ed. (Paris, 1669).
3. Thévenin (n.2), p.164.

3.13 JOHANN SCHULTES

(Joannis Scultetus 1595-1645)

3.13.1 Biography

Bakay¹ provided some historical data concerning Schultes: this was derived from an earlier contribution by Strohl².

Johann Schultes was born in Ulm, a city in the State of Swabia on the shores on the Danube, on 12th October, 1595. From the age of fifteen, he studied under Fabrizio and Adriaan van den Spieghel, a Belgian surgeon and anatomist, in Padua. Schultes received his doctorate in medicine, surgery and philosophy in 1621 and practiced briefly in Padua and Vienna. After a period as a military surgeon during the thirty years war, he settled as the physician to his native city of Ulm. He held this position at his death, which occurred on 1st December 1645 whilst he was visiting Stuttgart.

As a surgeon, Schultes was variously described as "bold and imaginative"¹ or "too adventuresome, abusing some remedies"³. His surgical work "Armamentarium chirurgicum" first appeared eight years after his death and was published by his nephew, Johann Schultes the younger, in 1653.

3.13.2 Bibliography

The text of "Armamentarium chirurgicum" was arranged in two distinct sections. The first dealt with the instruments of which a surgeon would have need and the second took the form of a centuria of case histories. The latter type

of presentation was an established form and had already been met with in the writings of Amatus⁴ and Fabry⁵.

A copy of the first edition of Schultes' work (1653) was not available, but relevant description and comment on the palatal obturator was traced through a number of editions:

Ulm,	1655.	Folio ⁶
Hague,	1656.	8° 7
Hague,	1662.	8° 8
Venice,	1665.	8° 9
Frankfurt,	1666.	4° 10
London,	1674.	8° 11
Leydon,	1693	8° 12

Figure 11 demonstrates how the illustrations of Schultes' obturator varied from edition to edition. The engraving for the folio edition of 1655 clearly demonstrated the palatal defect, a sponge obturator and forceps to aid the insertion of the appliance. The re-engraving for the octavo edition of 1656 was necessarily of a smaller size and detail of the palatal defect was lost. By 1662, the stalk on which the sponge was mounted had been omitted from the plate: the illustration was reproduced in this form in the 1674 English translation and 1693 Leyden edition. The 1662 engraving was used as the basis for the new 1665 illustration, which showed similar errors and omissions. In the editions to 1665 and in the English translation, the relevant figure had been number iv on plate (tabula) 36. The Frankfurt edition of 1666 represented a major departure in which the text was re-arranged; figure i on tabula 33 was a completely new illustration showing the insertion of an obturator, whilst

figure iv on tabula 11 was a reproduction of Hildanus' metal plate to which a sponge could be stitched¹³. (Compare figure 11 iv with figure 10).

In all the editions consulted, apart from the Frankfurt, observation 25 of the centuria of case histories dealt with a palatal perforation treated by means of an obturator. In the Frankfurt edition alone, the history was related in observation 36.

3.13.3 Schultes' Texts on the Obturator

The texts on the palatal obturator found in Schultes' work took the form of explanations relating to the plates (as discussed above) and a case history.

3.13.3.1 Annotation for Tabula 36 (Taken from the 1674 English translation¹¹ and representative of the Latin text of the 1655, 1656, 1662 and 1665 editions; see figure 11 iii).

"Fig. IV, shews a Palate eaten away with the French Pox, so that the hole passed through into the cavities of the nose, and hindered the voice from being articulately pronounced; this I stopt with a golden Instrument, to which a sponge was fastened, whereby the Patient spoke his words plainly and distinctly. After the use of the decoction, I touched that hole with red hot irons, which nature, after that some small bones were cast off, filled with flesh; when the ulcer was filled with flesh, I brought it to cicatrize with Gargarisms and drying Errhuis".

3.13.3.2 Annotation for Tabula 33 (A translation from the Latin of the Frankfurt, 1666 edition¹⁰. The patient illustrated in the plate is named for the first time in this

annotation).

"Fig. 1 shows the palate of J.R a citizen of Ulm, so eaten away by the Gallic disease that that gap, penetrating right into the cavity of the nose prevented the spoken voice from being enunciated. With an instrument made from gold (Tab. xi, fig. iv) which has a small sponge fixed to it, I closed this gap so exactly that the patient was able to express the opinion of his mind in clear and articulate words just as if he were healthy.

"After the use of a decoction of 'Hydrotic wood', the ulcer having been touched several times with burning irons, nature filled it with flesh, where previously several small bones had been opened; and when it was filled, I myself brought it to a cicatrix by washing out of the mouth and with drying and sternutatory substances".

3.13.3.3 Annotation for Tabula 11 (A translation from the Latin, unique to the Frankfurt 1666 edition¹³; see figure 11 vi).

"Fig., IV is a gold instrument of Hildanus (cent. 2 obs. 22) to which a small sponge may be fixed in order to plug the gap in an eroded palate; which, penetrating into the cavity of the nose, prevents speech from being articulately and distinctly produced. See Tab. xxxiii, fig. i etc".

3.13.3.4 Observation 25 (Taken from the 1674 English translation¹⁴, it is representative of the Latin text of the 1655, 1656, 1662 and 1665 editions and also observation 36 of the 1666 edition).

"Of a callous Hollowness, and Corruption of the Palate

Bone". "The most Noble and Reverend Dean, D. à Croneburg, in the year 1626 complained of a Periodical pain of the teeth, and a troublesome hollowness in the roof of his mouth; and by that eminent Physician of Ausburg, Johannes Wolfgangus Beer, desired my advice and help: and this Disease taking its origins from the suppression of the Haemorrhoids; I advised that the most Reverend Patient would be pleased, after a sufficient quantity of bloud taken out of the Basilica of the left Arm, to purge away the superfluous, and excrementious humours, with a purging Wine; to open the Haemorrhoides with Leeches, and to make an Issue in the left thigh: whereby those humours, which ascended to the head, and part affected, encreasing the pain of the teeth, might be evacuated by revulsion, and discharged by the Issue; for preventing the force of the pain, I proposed the operation in the Anthelix; which the forementioned Physician did most dexterously perform with my Iron Instrument, red hot; this being done, we took care to draw out the rotten tooth, whereby the injections of the Decoction Divinum, used in the cure of rotten bones, might pass through the Cavity which the tooth left, and reach the fistulous hollowness in the roof of the mouth; but seeing the Cavity of the tooth, and the callous hollowness of the Palate did not close, nor was there hopes that the Patient should be cured without the help of fire; I asked him if he would trie the efficacy of this only Remedy left, which we might do with great hopes of recovery; and he admitting of it, I sent the Instrument

described, Tab. I, Fig. IV. to Ausburg, to D. Beer, with which, being made red hot, he cut down the rottenness of the Palate, to the hollowness of the tooth, without the loss of the least drop of blood; and turning this Instrument round, he made a notable impression upon the bone. The Eschar being taken off, the rottenness of the Palate bone came in sight; which being touched three or four times with the Iron Instruments red-hot, Tab XIX, Fig. VIII, and IX, and nature being assisted by the taking of drying Medicines, made a separation, and the Ulcer being consolidated, the Patient recovered his former health, and kept open the Issue in his thigh for many years with great benefit".

3.13.4 Discussion

In 1820 de la Barre¹⁵ had accused Schultes of copying Paré's instrument and ascribing it to Hildanus. Snell¹⁶ abstracted this item and included a rather obscured translation of de la Barre's view in his own writing on the subject:

"Sculdetus in his Magazine of Surgery gives a very incomplete description of an instrument for supplying a defective Palate. It is merely a sponge obturateur, with no improvement upon the aforementioned. This instrument, which he had engraved in 1685, he states to have been by Fabrice de Hildan, but it is generally supposed very erroneously, as that author published in 1595, it is therefore most likely he was acquainted with the one described by Ambroise Paré".

On examining the earlier editions of Schultes' work it was difficult to grasp the point which de la Barre and

Snell were trying to make. Whereas the tabulae described a simple sponge obturator, there was nothing to suggest that Schultes had copied it from Paré. Mention of Hildanus' obturator was not made until the 1666 edition but the illustration was undoubtedly correctly ascribed, as comparison between figures 11 vi and 10 demonstrates.

A clue to the cause of the confusion was provided by Dr. F.E.R. de Maar¹⁷ who provided photocopies from a volume of Schultes' work in his possession. The publication was in Dutch and the title page of an appendix was translated as:

APPENDIX

of several and many newly discovered

TOOLS

necessary to surgery.

As well as about a hundred

REMARKS

of the most famous practitioners of the United Netherlands together with a short resumé of the whole of

SURGERY

Amsterdam 1670.

Page 472 carried reproductions of the original engravings of many of Paré's prostheses. These included both types of obturators, which were described on pages 474 and 475.

Reference to "Biographisches Lexikon"¹⁸ confirmed that Schultes' work was "later considerably augmented by J.B. Lamzweerde and P.H. Verdyun". The 1693 Leyden edition was bound with a separately paginated appendix dated 1692.

The title page of the appendix was worded (in Latin):

"The Appendix of various old as well as recently invented instruments for the Armamentarium Chirurgicum of Johann Schultes, together with one hundred and four surgical observations practised by the skilled men of this age, noted down and assembled by Joh. Baptist of Lamzweerde".

The plate facing page 25 of this appendix was almost identical to the reproduction of Paré's prostheses which appeared in the Dutch translation of 1670. The only variation was in the numbering of some figures.

These items of evidence, taken together, suggested that de la Barre had superficially consulted a late edition of Schultes' work. He had read the reference to Hildanus' obturator, but found only the reproduction of Paré's prostheses in the appendix. Snell subscribed to de la Barre's error quoting an edition of 1685, which could not be traced.

Schultes probably ascribed the palatal perforation to "suppression of the Heamorrhoids" out of respect for the Reverend Dean's calling. Reference to the use of red hot irons for the cautery of the ulcer and exfoliation of diseased bone is reminiscent of the writings of Schultes' teacher, Fabrizio, who recommended "small iron implements" for the purpose¹⁹.

1. Bakay, L. The treatment of head injuries in the thirty years war (1618-1648) Joannis Scultetus and his age (Sprongfield, 1971), 3-4 and 34.
2. Strohl, E.L. 'Johannes Scultetus (1595-1645)'. Arch. Surg., 1963, 87, 396-397.
3. 'Scultetus' in Jourdan, A.J.L. (editor) Biographie médicale (Paris, 1825), 7 vols., VII, 185.
4. See section 3.2.2.
5. See section 3.9.2.
6. Scultetus, J. Armamentarium chirurgicum (Ulm, 1655), p.45.
7. Scultetus, J. Armamentarium chirurgicum (Hague, 1656), p.135.
8. Scultetus, J. Armamentarium chirurgicum (Hague, 1662), p.133.
9. Scultetus, J. Armamentarium chirurgicum (Venice, 1665), p.126.
10. Scultetus, J. Armamentarium chirurgicum (Frankfurt, 1666), p.67.
11. Scultetus, J. The chyrurgeons store-house, Englished by E.B. (London, 1674), 154-155.
12. Schultes, J. Armamentarium chirurgicum (Leyden, 1693), 142-143.
13. Scultetus (n.10), p.18.
14. Scultetus (n.11), 270-271.
15. de la Barre, C.F. Traité de la partie mecanique de l'art du chirurgien dentiste (Paris, 1820), 2 vols., I, 300.
16. Snell, J. Observations on the history, use and

construction of obturateurs, 2nd. ed. (London, 1828),
p.11.

17. de Maar, F.E.R. Personal correspondence, 1972.
18. 'Schultes' in Biographisches Lexikon, 2nd. ed. (Berlin
and Vienna, 1934), 5 vols., V, 156.
19. See section 3.6.3.

3.14 RICHARD WISEMAN (1622?-1676)

3.14.1 Biography

An exhaustive study of Wiseman's life and activities was made by Longmore¹. This was abstracted by Power for inclusion in the "Dictionary of National Biography"².

Wiseman (figure 12) was apprenticed in 1637. Although English (he established his lineage from a gentleman's family and thus his right to use a coat of arms³) his first military service was with the Dutch Navy. Wiseman subsequently joined the Royalist army as a surgeon in 1643 or 1644 and, after the rout at Truro in May 1645, followed Prince Charles to Scilly, Jersey, France and Scotland. The surgeon was still with his prince in February 1649 when the news of Charles I's beheading was broken to them in the Hague.

Returning to England as a supporter of the Royalist cause, Wiseman was taken prisoner at Worcester, in 1651. His political convictions did not prevent him from attaining the freedom of the Barber-Surgeons Company in 1651-2, or from running a practice at the sign of the Kings Head, Old Bailey. In 1654, Wiseman was re-arrested for complicity in the escape of a Royalist patient of his from the Tower. Between his release from prison for this offence and the Restoration in 1660, Wiseman probably served in the Spanish navy. His loyalty to the Crown was rewarded by appointment to the royal household (1660) and promotion to Sergeant Surgeon in 1671. Wiseman was made Master of the Barber Surgeons Company in 1665. He died at Bath in 1676.

3.14.2 Bibliography

Wiseman published a treatise on wounds in 1672, but for the purposes of the present study, interest centred on his "Several chirurgical treatises" published in the year of his death⁴. The first edition was printed for the booksellers R. Royston and B. Tooke of St. Paul's Churchyard. There were a number of typographical errors, for example the referencing of the page headings in the eighth book as belonging to the seventh. All these errors were incorporated in a pirated folio of 1692, printed for a rival bookseller in St. Paul's Churchyard, Samuel Clement. Meanwhile, a second edition had appeared in 1686 printed for Royston. The pagination was continuous, (in the first and pirated editions the eighth book had its own pagination): the eighth book was now also correctly referenced. The title of the work was altered to "Eight chirurgical treatises" for the third edition. The fourth edition continued in folio (1705) but the fifth (1719) and sixth (1734) editions appeared in octavo form, two volumes for each section.

3.14.3 Wiseman's References to Palatal Obturation

In the fourth chapter of the eighth treatise, Wiseman mentioned the use of the palatal obturator, once in general terms and twice in the course of case histories. These references were traced in the first⁵, pirated⁶, second⁷, third⁸, fourth⁹, fifth¹⁰, and sixth¹¹ editions of the treatises.

3.14.3.1 "Treatment of Ulcers of the Tonsils and Palate"

"In ulcers of the tonsils and palate Rx whole Campanula, 3 handfuls. Honeysuckle, Blackthorn, male Speedwell, of each 1 handful. Flower of red rose,

one-eighth of an handful. Red Sanders, Juniper wood, of each half an ounce. Boil down in 4 pounds of Barley Water to a third part for consumption. In the filtrate dissolve syrup of dried Roses, Diamoron (a preparation of mulberries and honey), of each 3 ounces; Honey, $2\frac{1}{2}$ ounces. Make a lotion.

"With this, the ulcers may be washed daily, either by a syringe or gargling. But if the ulcers be behind or over the palate, the best way to cleanse them will be to pass the injection up into the nostrils. During the while, the Patient must hold his mouth full of water to prevent coughing or beeking. If the ulcers be sordid, dress them with sublimated milk upon an armed probe. If there be caries in the os palati, touch it with acqua divina Fernellii (a weak solution of corrosive sublimate in plantain water described by Jean Fernel, 1497-1558). In case the bone be corrupted though, it will be necessary that the place be supplied by some plate or paste: the former are made of Silver or Gold by our Workman to good advantage.

"Those of paste may be made as followeth: Rx of clear, powdered Mastic, 1 ounce, soften it in Alcohol and take Olibanum, Sandarac, Guaiacum resin, Dragons blood, Orris root, Myrrhh, burnt Hartshorn and Amber of each 1 drachm. Mix and make into a paste from which thin plates may be formed. Which being fitly applied to the part will dispose the Ulcer to heal, and serve those ends you design it. But if some part of that bone be carious, Rx of the plates previously described, 1 ounce; Aristo-lochia rotunda, 1 drachm; the roots of Peucedanum and

of gentian, of each $\frac{1}{2}$ drachm and 2 scruples of clove.
Powder and mix them with a little Cyprian turpentine.
Prepare for use".

3.14.3.2 Case Histories

Wiseman described the use of palatal obturators in two of his observations appended to chapter 4 of the eighth treatise.

Observation 48 concerned a 40 year old patient suffering from ozaena. Treatment was by purging, sweating and anointing to increase salivation; the case notes continued:

"During the time of his salivating, the ulcers in his Nose cured and so did that in his Palate, but the bones that they had pulled away left the marks; yet that in the palate was supplied by a small Plate which was retained by a Sponge".

Observation 49 related the case history of a 28 year old sufferer from venereal disease. Early treatment embraced the application of a seton, the administration of white mercurial precipitate on a spoonful of white bread and milk night and morning and the use of mouthwashes.

"Soon after, as he recovered his strength, I left off the use of the milk and prosecuted the course by a strict diet, iron sweating decoctions, etc. then fitted his Palate with a Plate of silver which he could put up and take out at pleasure. It formed his voice and served to lead the drink its right way. Some months after I saw him fit and well, and he assured me that the ulcerated parts were so contracted together that he had no further

use of the artificial palate".

3.14.4 Discussion of Wiseman's Contributions

Although Wiseman's mouthwashes for oral ulceration contained ingredients peculiar to the prescriber, their general soothing nature was reminiscent of Fabry¹², as was the application of a seton to draw off the humours. The use of mercuric compounds for the treatment of venereal disease was, of course, general practise but Wiseman demonstrated an initiative in the application of other well tried drugs. His impregnated resinous plates combined the functions of a vehicle for the local application of drugs and the occlusion of a perforating ulcer.

There is a universal and unchallenged belief held by writers who mention Bourdet (1757) in the context of palatal obturator design, that this dentist introduced the concept of an obturator which covered a defect, rather than one which entered the void. Such writers overlook the contribution of Wiseman which had a precedent of over 80 years.

Wiseman was careful to distinguish between ulceration of the soft tissue and situations where the bone was involved. There is an implicit differentiation in the prognosis for the two instances; an observation which was made more forcibly by Zacutus¹³ and Tulp¹⁴ and dates back to the time of Renner¹⁵.

Snell¹⁶, whilst drawing attention to Wiseman's contribution, did not comment on its significance; the recipe for the resinous plates was abstracted, but left in the original Latin. Snell did not indicate Wiseman's first hand experience of the problem of palatal perforations, as

illustrated by the case histories.

It was probable that Wiseman's position as a court surgeon brought him into frequent contact with this type of syphilitic manifestation. After the rigors of the Puritan Regime, there had been a nationwide reaction epitomised by the promiscuity of Charles II. In the words of Churchill:

"Court life was one unceasing flagrant and brazen scandal"¹⁷.

1. Longmore, T. Richard Wiseman (London, 1891).
2. Power, d'A. 'Wiseman' in Dictionary of national biography (London, 1909), 22 vols., XXI, 717-719.
3. Longmore, (n.1), 6-7.
4. Wiseman, R. Several chirurgical treatises (London, 1676).
5. Ibid., pps. 19-20 and 41.
6. Wiseman, R. Several chirurgical treatises (London, 1692), 19-20, 41.
7. Wiseman, R. Several chirurgical treatises (London, 1686), 517-518, 538-539.
8. Wiseman, R. Eight chirurgical treatises (London, 1696), 503-504, 525.
9. Wiseman, R. Eight chirurgical treatises (London, 1705), 483-484, 503.
10. Wiseman, R. Eight chirurgical treatises (London, 1719), 2 vols., II, 328, 365 and 367. (The latter page was incorrectly numbered as 366 was omitted).
11. Wiseman, R. Eight chirurgical treatises (London, 1734), 2 vols., II, 324, 362-363.
12. See section 3.9.3.
13. See section 3.10.3.
14. See section 3.11.3.
15. See section 3.1.2.
16. Snell, J. Observations on the history, use and construction of obturateurs, 2nd. ed. (London, 1828), 7-8.
17. Churchill, W.S., A history of the English speaking peoples, 3rd. ed. (London, 1963), 4 vols., II, 272.

3.15 CORNELIUS SOLINGEN (1641-1687)

3.15.1 Biography and Bibliography

According to the account given by Daniels¹, Solingen was not an engaging character. He was born on 29th May, 1641 in Gorinchem (near Dordrecht): the family name seems to be of German origin as Solingen is a town some 20 km. east of Dusseldorf. Early surgical training was undertaken in the Hague, where Solingen was a pupil of A. de Rovere and Luc de Foi. He subsequently studied anatomy under de Bils in Rotterdam and Tobias Andreae in Den Bosch, was assistant to the surgeon J. de Ram in Haarlem and in 1663 sailed as a ship's doctor with Admiral den Tromp's fleet in the Mediterranean. On returning to the Hague he took up surgical practice, but in 1675 was a registered student in Leyden. Solingen graduated at Utrecht in 1677. His early career and training as a surgeon thus followed the classic pattern of the time, arranged on a somewhat informal basis and including naval or military service to gain experience of wound surgery. Qualification came with maturity in the calling rather than at the completion of early training.

Solingen was not above thrashing his colleagues in public and was in trouble at the courts for such behaviour. His textbook on surgery, "Manuale operationen der chirurgie", was published in 1684 and was written in Dutch. The only other edition of the work was the German translation of 1693, published in Frankfurt a.O.

3.15.2 Translations of Solingen's Text²

Book I Chapter LXIII

"It sometimes happens that children are born without a palate or having a hole in it; other people have the same trouble caused by the Spanish disease.

"This is attended to with a small silver plate which is slightly curved and hollow, having a small eye at its curved side, or a small plate with a handle, to which a sponge is attached, which is put into the hole, and being swollen, prevents the plate from dropping and also closes the hole.

"It is better to use a tiny tin or coldly minted silver spring attached to the upper side of the plate, which is at a distance from the other (side) but which, when being applied, is nipped together by a pelican until it fits into the hole, then the plate is pushed upwards; this being done, the spring of the other (side) clicks and thus keeps the plate in its place.

"In this plate less dirt accumulates than in the sponge, which often smells and needs to be renewed, which is not necessary with the former".

3.15.3 Discussion

The numbering of the chapter as 63 was a printer's error and should have been given as 43. Had the chapter included nothing but mention of the sponge obturator, it would have merited the cursory attention which it received from Snell. However, the second type of obturator was not one which figured so largely in the literature. The description would

seem to match the illustration in figure 1, number 12 which Cullerier was to contribute much later. By the nature of Solingen's description, it would seem unlikely that the spring obturator was of his own design; however, it was an early allusion.

3.15.4 Solingen and Johann Muys

Johann Muys was a contemporary of Solingen who published a work "Praxis chirurgica rationalis" in two volumes, 1683-85³. Little is known of Johann Muys, who was overshadowed by his son, Weir Muys. However, one source⁴ briefly mentioned Muys the elder as a surgeon with bad theories but one who was capable of giving interesting accounts.

"Praxis chirurgica rationalis" took the form of a centuria of observations arranged in ten decads. The first five decads were collected in the volume published in 1683: the remaining fifty observations comprised the second volume of 1685. Solingen's "Manuale operatien...." was published during the intervening year.

Muys made mention of the palatal obturator in observation 10 of the seventh decad, contained in the second volume of "Praxis chirurgica....". Unfortunately, this volume was not available for consultation, neither was the English translation of 1686⁵. The only available source was a French translation supposedly from Muys work entitled "New observations of surgery after modern thought" (Nouvelle observations de chirurgie, suivant l'opinion des modernes) which was attributed to a Monsieur M⁶. This text included mention of Solingen's spring obturator. As Solingen's work was published in the year previous to Muys' original second volume, it

would have been interesting to confirm that Muys did make mention of Solingen's work and that this was not an embellishment provided by the translator. A translation from the French reads as follows⁷:

"I know a syphilitic in whom a large piece of the bone of the palate fell due to caries and who was obliged to close the hole with a plate of silver attached to a sponge to be able to articulate his speech. Saliva taints the sponge in time and as this contracts a bad odour, one no longer puts it on a silver plate, to which one gives a spring so that it is able to hold (in place) by itself. See the treatise of Solingen already cited, book 1, chapter 63".

1. Daniels, C.E. 'Solingen' in Biographische Lexikon, 2nd. ed. (Berlin and Vienna, 1934), 5 vols., V, 335.
2. Solingen, G. Manuale operation der chirurgie (Amsterdam, 1684), p. 86.
3. Muys, J. Praxis chirurgica rationalis (Leyden, 1683-85), 2 vols.
4. Dezeimeris, J.E. 'J. Muys' in Dictionnaire historique de la médecine ancienne et moderne (Paris, 1834), 7 vols., III ii, 624.
5. Muys, J. A rational practice of chirurgery translated by J. W. (London), 1686.
6. Monsieur M. (supposedly Muys, J.) Nouvelles observations de chirurgie, suivant l'opinion des modernes (Lyons, 1700).
7. Ibid. p.404.

CHAPTER 4

THE PALATAL OBTURATOR IN THE GENERAL
LITERATURE OF THE EIGHTEENTH
AND NINETEENTH CENTURIES

4 THE PALATAL OBTURATOR IN THE GENERAL LITERATURE OF THE EIGHTEENTH AND NINETEENTH CENTURIES

4.1 Introduction

It may appear quite arbitrary to draw a line at the end of the seventeenth century and pass from detailed discussion of authors on the palatal obturator to a more cursory consideration. The conclusion of a century represents only a division of time, not a natural interval in technical development.

There were two factors which encouraged a change in the nature of the discussion at this stage. Firstly, widespread reference to the palatal obturator in the general surgical literature of the eighteenth and nineteenth centuries is repetitious of established designs and concepts. Beyond the end of the seventeenth century it becomes difficult to demonstrate the specific influence of individual writers and teachers on their followers in respect of traditional obturator design. By this time, the designs had become part of the general surgical armamentarium and had ceased to be associated with individuals. The obturator as used in cases of acquired palatal defect and described in the general literature was thus approaching stagnation.

Secondly, the early eighteenth century saw the arrival of the chirurgien-dentiste and the establishment of specialised dental literature¹. Although the surgical texts continued to recommend the obturators originated by the renaissance authorities, the emerging dental profession brought with it a wave of fresh thought and development. By

comparison therefore, the surgical literature declined in significance from the end of the seventeenth century.

Despite and indeed because of this loss in momentum, the obturator as described in the general literature remains worthy of some further consideration. Although there were some innovations in materials and method, it was noticeable that the general literature rarely borrowed from developments in the dental literature. During the eighteenth century and the earlier part of the nineteenth century the two remained peculiarly insular.

In the first edition of his work, Snell named authors of general surgical works whom, he claimed, had made reference to the palatal obturator². In the second edition, the following group of names was missing: Camper, Eckardt, Frize, von Leveling, Purmann, Siebold and Vylhoorn. It was possible to check on the works of Camper³, Purmann⁴ and Siebold⁵, but although mention was made of hare lip, palatal ulcer and ozaena by these authors, no reference could be found to the palatal obturator. Between editions Snell had probably checked the references, which were doubtless derived from a bibliography, and found those missing from the second edition to be inaccurate.

Guérini⁶, whose work on the history of dentistry featured considerable commentary on reference to dental subjects in the surgical texts, did not include the palatal obturator of this period.

More recently, Strömberg included a classification of hare-lip and defectus palati in her bibliography⁷. Those references which it was possible to follow up did not reveal

any relevant material which had not been derived from other sources.

4.2 René Jacques Croissant de Garengéot (1688-1759)

Garengéot described a simple sponge obturator in considerable detail, but it is not for this that he was of particular interest. The pattern of his life interwove with that of his contemporary, Pierre Fauchard. It transpired that Didier⁸ had already noted points of contact between the two and identified Garengéot as the surgeon whose work had been criticised by Fauchard. (Vide infra).

Garengéot was born in Vitre, Brittany on 30th July, 1688⁹. His father was surgeon at the hospital of the town and later educated his son in surgery. Garengéot the younger held an appointment at the sailor's hospital in Angers, followed by two campaigns at sea. In 1711 he settled in Paris and was resident in the school of surgery for six years: at the same time he attached himself to prominent surgeons of the day for instruction.. He qualified as a Master of Surgery in 1725, but by this time had already published a treatise on surgical operations (1720) and another on surgical instruments (1723). In 1728, Garengéot was appointed as Demonstrator in Materia Medica and Surgery; he became a member of the Royal Society in London during the same year and held office in the Royal Academy of Surgery in Paris from its institution until 1742. In that year, Garengéot became surgeon-major to the Kings Regiment of Infantry: he died of apoplexy on 10th December 1759 whilst on a campaign in Cologne.

4.2.1 Garengeot and Fauchard

Both Garengeot and Fauchard were Bretons, both had associations with naval surgery and Fauchard was practising in the Angers area at a time when Garengeot held his appointment at the Hospital there¹⁰. Garengeot was ten years younger than Fauchard but went to Paris eight years ahead of the older man: both made considerable impact in their respective fields once established in the metropolis..

The original manuscript of Fauchard's work, "Le chirurgien dentiste", rests in the library of the Medical Faculty in Paris. It was completed in 1723, the year in which Garengeot's treatise on surgical instruments was first published. Chapter 24 of the second volume of "Le Chirurgien dentiste" (1728 edition) was entitled "Remarks on a chapter of a new treatise of surgery"¹¹. The author of this new treatise was not mentioned, but Fauchard evinced surprise at finding a chapter on the teeth in a treatise of surgical instruments when it was more suited to the same author's publication of 1720. This description and accompanying dates would suggest that the anonymous author was Garengeot, but Didier also found mention of Garengeot's name on Fauchard's original manuscript⁸. Fauchard did not make any comment on Garengeot's obturator.

4.2.2 Garengeot's Description of His Obturator

The following description was translated from the second edition of Garengeot's treatise on surgical instruments¹². See figure 13.

"We are going to finish this section with an

instrument called the palatal obturator.

"Although this instrument must be called small, nevertheless we scrutinise therein three parts, which are a plate, a stalk and a nut; the material which enters into the construction of all these parts is silver.

"The shape of the plate is oval, tolerably resembling a small, slightly hollowed basket: the concavity faces the lower surface and the convexity is found above. The length of this plate is an inch and a half or thereabouts and the width, one inch only: the entirety of the plate is highly polished and not more than half a line thick.

"The second part of the palatal obturator is a stalk also of silver, which arises from the centre of the convexity of the plate; it's height is about eight or nine lines and the diameter a good line and a half. It is exactly round and ends at the tip with a screw which has two threads.

"Lastly, the third part which helps to form this instrument, is a silver nut: it is about three lines in diameter in all directions, for it is exactly square; and its thickness is one line. The nut is engraved in the centre by a spirate hole, of a width proportional to the size of the stalk.

"To assemble this instrument for use, one takes a fine sponge which one cuts on one side in such a way as to leave a flat surface, then one cuts the remainder with scissors so that the result is in the form of part of a

sphere, or half a globe. One then pierces this half globe vertically, from the base to the summit and passes into this vertical hole the stalk of which I have made mention, observing to turn the flat surface of the sponge next to the convexity of the plate. One fixes and fastens this sponge onto the stalk, by means of the small nut which engages on the small screw thread which is at the extremity of the stalk.

"The means of putting this instrument to service consists of soaking it in some fluid in order to wet the sponge; then one presses it a little and introduces it with the stalk into the opening or hole which the pox or scurvy has caused in the palate.

"The use of the obturator is to serve to close a hole which the pox, the flux de bouche or scurvy frequently produce in the vault of the palate and to prevent by consequence the sufferer from speaking through the nose, he will only nasalise without this instrument, and have difficulty in making himself understood. When these sufferers open their mouths to yawn, one sees only the silver plate which will appear to stick to the vault of the palate".

"Explanation of the thirty-first Plate"

"The third figure indicates the palatal obturator with its nut. (See figure 13).

F. The outside or convexity of the plate.

G. The stalk at the extremity of which is a screw.

H. The nut which is mounted on the screw".

4.3 Lorenz Heister (1683-1758)

Heister provided considerable information about his life and activities in the preamble to his work, "Institutiones chirurgicae"¹³. He was born near Frankfurt on 19th September, 1683 and from 1702 studied for four years at the Universities of Geissen and Leyden (according to "Biographie Médicale"¹⁴ - Heister himself merely stated "at our German Universities"). Moving to Amsterdam in 1706, he studied anatomy and surgery under Ruysch. The Flanders war intervened in 1707 and Heister attended the Dutch camp to observe the work of English, Dutch and German surgeons who were in attendance. Having taken his degree at Leyden in 1708, Heister practised in Amsterdam but returned to the battlefields during the summer campaigns as an army surgeon.

Heister's publications date from the year of his graduation. He entered academic life in 1710, when, after a visit to Britain, he took the chair of Anatomy and Surgery at the University of Altorf. In 1719, he moved to Helmstadt, where the chair of Anatomy and Surgery was in the gift of George I as Duke of Brunswick.

In giving this account of his work, Heister mentioned the necessity of improving upon the methods of Fabrizio, Paré, Schultes and Solingen. The illustrations which he presented, however, showed that he could devise no improvement on their traditional design of palatal obturator.

4.3.1 Heister's Account of the Obturator

The obturator appeared in "Institutiones chirurgicae", first published in 1739¹⁵. An English translation was made in 1742, from which the following was taken¹⁶. (See figure 14).

"Of stopping Perforations of the Palate into the Nose"

"When the Palate is perforated into the Nose, so as to vitiate the Speech, and occasion Liquors to regurgitate into this Organ upon drinking, your Remedy in this Case is to close or stop the Perforation as exactly as possible by Art, with a proper Instrument; since you cannot procure the Bone and Flesh to grow so as to fill up the Space. The Patient must therefore have a Plate of Silver or Gold adapted to the perforation, and furnished with a Handle or small Tube, which being armed at the top with a Sponge, as in Tab. XXI. Fig. 4, 5 he may thereby exactly close the Perforation. The sponge being inserted into the Perforation, prevents the Plate from falling down from the Palate, and by that means renders the Patient able to speak and swallow, as if his Palate was entire: But he should be provided with two of these Instruments, that after one has been worn a Day, it may be extracted, washed and dried against the next Day, to prevent the imbibed Humours from putrifying and smelling. I once saw such a Perforation of the Palate, occasioned by a Bullet in an Officer, which was remedied in this Method".

James¹⁷ had either made or derived an alternative translation of this same chapter for inclusion in his "Medicinal Dictionary" under the heading of "Palate".

"The Method of Stopping Perforations through the Palate
to the Nose"

"When by these Perforations the Voice is injured and Liquids are discharged by the nose, as Nature cannot stop them up by a new Supply of Bone and Flesh, we must have

recourse to Art. A Plate, therefore of Gold, or Silver, must be adapted to the Perforation, having a Tube or Handle with Holes (See Tab. XXXXII fig. 4, 5.) A piece of Sponge must be fixed to the End of this Handle, which, being inserted in the Perforation prevents the plate from falling down from the Palate; by which means the natural Voice of the Patient will not only be restored, but likewise the Power of Deglutition, in the same manner as if the Palate was entire. However, he should be provided with two of these instruments, that they may be changed, and the sponge washed in Water every Day, lest the Humours attracted by it should putrify to grow fetid. I once saw a large Perforation of the Palate, occasioned by a leaden bullet, in an officer, which was remedied in this manner".

The illustrations which James gave for the obturator he described were re-engraved from Heister's work. (Figure 14). The reproduction was a faithful one, only the perspective of the appliances had been altered slightly. The smaller obturator bears obvious relation to that described by Fabry¹⁸ whilst the plate with a handle must be of a similar genus to one of those described by Solingen¹⁹.

4.4 Jean Astruc (1684-1766)

Astruc is remembered chiefly for his review of the works on venereal disease. First published in 1736 as six books²⁰, "De morbis venereis...." was revised and extended to be republished as nine books in 1740²¹. A new English translation was made of the latter edition and was published

in 1754²²: it was to this that Snell subsequently made reference. Amongst the additions to the revised text was mention of the palatal obturator. The relevant passage as translated in 1754²³, read as follows:

"When the palate bones are destroyed, or either of the maxillary bones perforated in the middle of the roof of the palate, as far as the nose, it is not enough to stop the progress of the caries with proper medicines, but it will be necessary at the same time to remedy the defect of the speech, which is now uttered hoarsely, and indistinctly through the nose. It was the practice formerly to adapt a gold or silver plate to the roof of the mouth and by the help of a soft piece of sponge which was fastened to the back of this plate and thrust in the hole it was kept in its proper place. Upon this subject consult Ambroise Paré, book XXXIII, chap. 4 and William Fabricius Hildanus, centur. 2. observat. 22. But since this sponge, by absorbing the mucous will be corrupted, and in a short time contract a foul stench, it has for some time past been usual to fit a small silver button to the plate, by which it is fitted to the hole and suspended as you may see in Cornelius Solingen, Operation. Chirurgica Lib. L. Cap. 43 and John Muys Praxeos Chirurgic. Rational. Decad. 7.Observat.10".

Comparison with Muy's writing²⁴ demonstrates that the latter part of Astruc's contribution (i.e. that following references to Paré and Fabry) was derived from Muy's work. It was worthy of note that although Astruc recommended a form of mechanical retention in preference to a sponge

retained obturator, he did not mention Paré's turnbuckle type of appliance.

4.5 Henri Callisen (1740-1824)

Callisen was born in Preetz (Holstein)²⁵. At 15 years of age he went to Copenhagen and became indentured as a barber-surgeon in order to study the crafts of military surgery. His first appointment as surgeon to a regiment garrisoned in Copenhagen was followed by two years as chief surgeon in a naval frigate. By the age of twenty-two (1762), Callisen had a combined appointment as a surgeon at the Frederick Hospital (Copenhagen) and demonstrator at the surgery teaching theatre. In 1766 he received royal patronage in the form of a travelling scholarship to France and England, where he studied the methods of Hunter. Recalled to Copenhagen in 1771, Callisen became chief surgeon to the fleet and, in 1773, Professor of Medicine at the University. After a distinguished career he retired in 1805.

4.5.1 Callisen's Account of the Obturator

Callisen's major work "Institutiones chirurgiae hodiernae", was published in 1777²⁶. It was augmented and republished as "Systema chirurgiae hodiernae" in 1788²⁷. The following extract was taken from a later edition²⁸:

"The Artificial Palate"

"1157 Sometimes ulcers arise on the palate (which are) so malignant that they erode not only the soft tissues but also the bones themselves and not infrequently spread as far as the nostrils. As a result there is caused a fearfully harsh sound, and a regurgitation through the

nostrils of things which have been consumed. The cause of an affliction of this kind is commonly found in venereal infections, or more rarely, in the corrosiveness of scorbutic or other humours. Now, openings of the palate penetrating into the nasal passages are hardly ever closed again, but remain open; accordingly the only relief for sufferers is to be found in this, that the gap should be blocked up by as skillful means as may be. However, the surgeon should not come to this method of treatment before the cause of the disease has been wholly removed by the appropriate therapy, and that no trace of suppuration or continuing erosion is present".

"1158 However, gaps in the palate may be obturated to such an extent that not only may patients recover the natural power of speaking clearly, but also of swallowing. A gold plate or one made from leather may be satisfactorily used for this purpose; it should be perforated with a number of small holes to which a piece of soft sponge has been afixed, exceeding by a little the breadth of the opening; the latter, inserted into the opening, holds the plate quite firmly. This quite simple method of treatment seems to us altogether preferable to other more complicated methods which have been invented. However, it is necessary to have at least two obturators at hand which should be daily changed and cleansed lest the humours which are soaked up by the sponge might gradually cause it to decay, affecting the neighbouring tissues and spreading an offensive odour. We have seen one unfortunate man, with the vomer and the greater part of his palate

eaten away, conceal his terrible disfigurement quite well. Forsooth! he had a nose shaped from lime-wood, stained and polished, hollowed out inside, holding a silver handle with a moveable ring, through which he drew a loop made from silken strands covered with wax. Through the fearsome gap of his nose and palate, he fastened (the thread) to a molar tooth; thus, then, he filled in the opening of his palate with the obturator".

4.6 Justus Arnemann (1763-1806)

Arnement saw the obturator as a remedy for congenital cleft palate. The malady was mentioned, not in its own right, but as one of the complications of cleft lip²⁹.

"II. The palate is also cleft. All the methods that have been suggested as a remedy, such as scarification, compression, balsamic means etc. are useless; nature alone is of help. As long as this does not happen, assistance can be given by an artificial palate. A piece of sponge fitted into the cleft, provided at the bottom with leather or a fine silver plate may be used for this purpose".

The underlined clauses are taken to mean that Arnemann was of the opinion that congenital clefts might heal spontaneously. Should this not occur, then an obturator might be considered. This is the type of evidence which could be used in support of Rogers' view that congenital clefts were thought to be of syphilitic origin in Arnemann's time³⁰. The notion of spontaneous healing of such lesions was not one which was frequently encountered, however.

4.7 Johann Erdwin Christoph Ebermaier (1769-1825)

Ebermaier wrote extensively on surgery, particularly wound surgery. It is of note therefore that, in the following extract³¹, traumatic causes of palatal perforations are not mentioned (cf Paré)³². Ebermaier recommends the provision of a palatal obturator for perforating ulcers which had healed to their limit. He gives criteria for the prognosis in such cases.

"Concerning maladies of the palate and tonsils".

1 Ulcers of the palate

"Ulcers of the palate are often of venereal origin and require the use of quicksilver, but taking care to choose a quicksilver medium that does not easily affect the mouth, giving rise to a flow of saliva, particularly as an abscess of the palate can be caused by excessive flow of saliva.

"In addition, abscesses can be caused by a damaged tooth in the upper jaw, by injury to the palate by a fish-bone, a jagged piece of bone etc. particularly when the foreign body remains embedded in the palate. Sometimes they can be caused by the ruined condition of the stomach, or by a bile-like acidity. In many cases, they bleed very profusely and are of a scorbutic type. The necessary care in these and similar cases must therefore be taken in their treatment. If the bleeding is caused by a varicose vessel as sometimes occurs, a cauterising iron is often useful.

"Abscesses and swellings on the palate easily cause

degradation (eating away) of the bone; they must therefore always be opened as soon as possible. But then opening the fleshy part of the palate, we must not thrust right through it, because otherwise an unnatural opening is caused, which sometimes does not close again throughout life. If the palatal bone is carious right through, an orifice is produced which brings about a joining between the mouth and the nasal cavity, associated with many difficulties, and has as a result the loss of a large part of the palate, the velum and the uvula.

"If the opening is not too large and not covered at the top by the mucous membrane of the nose, then it will close up again after removal of the damaged part.

"If, however, a smaller or larger opening remains after healing, then it must be closed to prevent the entry of food and drink into the nasal cavity. For this purpose several types of closure have been suggested which are called artificial palates. Probably the best thing to do is to insert into the opening a piece of sponge. It is shaped like the opening, but it must be somewhat larger, so that when it is inserted into the opening with some pressure it does not fall out again. As soon as it becomes moist, it swells and is more firmly fixed. On to the surface turned towards the mouth is fastened a small plate of gold, silver, brass or morocco leather so that the moisture in the mouth is not forced into the sponge and so that, at the same time, a smooth surface is presented to the tongue, which is not hindered in its movement. The sponge and the leather must be replaced frequently".

4.8 Some English writers of the Early Nineteenth Century.

This section includes consideration of two English surgeons, both Members of the Royal College of Surgeons, who practised as surgeon-dentists. Their contributions to the literature were not of a general nature, for Joseph Fox published a work on the teeth and James Snell the first British book on maxillo-facial prosthetics. However, it seems apposite to discuss their contribution in the context of English contemporaries. Some further justification can be made for their inclusion at this stage as their views were derived from a surgical rather than dental background.

4.8.1 Joseph Fox (1776? -1816)

The literature presented a measure of disagreement concerning Fox's dates. Weinberger³³ gave the date of death at 1816, but Cameron³⁴ quoted 1817. The later date was that entrenched at Fox's hospital, Guy's, where his name appears on the list of dental surgeons to the hospital as 1799-1817. As Fox's name disappeared from the minutes of the Physical Society of Guy's Hospital as from March 1816, there seemed to be some reason to suppose that Weinberger might be correct. An obituary was sought and found in the columns of the Gentleman's Magazine³⁵:

"April 10 1816. In Argyll Street, aged 40, Joseph Fox, esq. An eminent surgeon dentist and secretary of the British Foreign Schools Society. His loss will be deeply felt by the friends of Universal Education, to which his life was much devoted and of which he was a most active and zealous advocate".

Whilst the date of Fox's appointment as lecturer on the structure and diseases of the teeth to the medical students of Guy's Hospital could not be confirmed from hospital records, there is no doubt that he held such an appointment. Fox had been a student of Henry Cline at St. Thomas's Hospital; he in turn had inherited an interest in the study of the teeth from John Hunter³⁶.

The substance of Fox's text, "The history and treatment of the diseases of the teeth, the gums and the alveolar processes", was derived from his lectures to the Guy's students. The work ran to three editions: the second (1814) was a collected edition of the two parts published in 1803 and 1806. The posthumous, third edition (1833) was essentially similar to the second. In all three editions, the chapter dealing with imperfections of the palate remained unchanged. The following quotations demonstrate that Fox dealt with both congenital and acquired defects³⁷.

"Defects from incompleteness in the natural structure are sometimes met with in the palate, or roof of the mouth. There is much variety in these defects: in some there is a deficiency of the velum pendulum palati, or soft palate, in others there is a fissure extending through the whole roof of the mouth, both the bony and the soft parts being divided. These imperfections may be much assisted by artificial palates, so adjusted as to cover the opening and thus contribute to the comfort of the patient, by preventing the passage of food into the nose and also by rendering the sound of the voice more articulate.

But, as these blemishes are from birth, it is difficult to restrain persons from having recourse to artificial means until the body has attained its mature growth, when assistance may be given with effect and without injury. Artificial palates must be confined either by attachments to the teeth or to the sides of the fissure itself; if the teeth have not acquired their full strength, the necessary fastenings will produce their premature loss; and, if the attachment is made at the sides of the fissure, there is a great danger of increasing the defect by widening the opening, or of preventing such a degree of contraction as nature herself might effect".

"The bones of the palate are often affected by the secondary symptoms of lues, and considerable exfoliations are produced. Sometimes a large portion of the bony palate, together with the alveolar processes, and several of the front teeth are lost. These defects can generally be remedied with success. If there is simply an opening through the palate, a thin plate of gold may be formed as perfectly to cover it, and it may be secured either to the teeth or the sides of the orifice. If there should be a loss of teeth, combined with a defect in the palate, artificial teeth, having a false palate connected to them, may be so constructed as to restore the patient to his former appearance and capability of distinct articulation.

"In applying a remedy to defects of the palate, difficulty seldom occurs, excepting in those cases where

there is a loss of the velum pendulum palati the extreme irritability of the parts connected with it renders a successful use of any substitute, however ingeniously contrived, very doubtful, on account of the irritation which is often brought on by any foreign substance touching the posterior part of the tongue or fauces".

Fox's approach to palatal prosthesis was a cautious one. He counselled against the use of such appliances in cases of congenital cleft until the parts were fully formed and was at pains to point out the damage which prostheses could cause in both congenital and acquired defects. There is no evidence either way to suggest that this conservative attitude was bred from extensive or limited experience in the use of the appliances.

4.8.2 John Weiss and Astley Cooper

John Weiss was the founder of the firm of surgical instrument manufacturers. The second edition of his catalogue carried illustrations and a description of the palatal obturator which he had devised³⁸. Weiss' engraving is reproduced in figure 15; the accompanying description read as follows:

"A the key, B the instrument, with one half of the upper plate turned upon the other. C the appearance of the instrument when about to be passed into the mouth, with the key inserted. D represents the instrument as when worn, the key being withdrawn, and the upper plate forming a complete circle.

"To apply the instrument, insert the key into the

bottom plate and turn it half round so at C, then having placed it in the orifice, turn the key back again. The reverse mode will remove it when necessary".

In the main body of the text, Weiss described how his first instrument came to be devised and included some remarks of approbation from Sir Astley Cooper. Cooper, a contemporary of Fox had also received instruction from Henry Cline.

"Sir Astley Cooper in his lecture at St. Thomas's Hospital, May 10th 1824, treating of the exfoliations in the roof of the mouth, recommends the introduction of extraneous substances and observes:

"The best instrument I know is one contrived by Mr. Weiss, whom you all know to be an extremely ingenious man. A gentleman of rank and fortune, afflicted with soreness in the roof of the mouth, applied to Mr. Weiss to know whether he could make him something which would fill up the opening, and remain there without causing any inconvenience. Mr. Weiss immediately produced an instrument which gave the gentleman the greatest comfort and satisfaction, and answers much better than any other with which I am acquainted."

This accolade was followed by an admission from Weiss that his metal appliance could cause ulceration and that he had been induced to employ India Rubber to overcome this problem.

Incidental information concerning one of Weiss's rubber obturators came from a communication by Allan³⁹. This surgeon had requested an obturator from Weiss for a patient with a circumscribed lesion of the soft palate, who

presented with a history of failed treatment. Weiss supplied a form of India rubber stud obturator prepared from three sheets of rubber luted together: (cf. Gariel's obturator, section 4.9). As this appliance rapidly disintegrated, Allan prepared a stud of similar form carved from a single piece of rubber.

4.8.3 Thomas Alcock (1784-1833)

Thomas Alcock witnessed the operation of staphylorrhaphy as performed by Roux and introduced the procedure in London. In cases where this operation was unsuited, Alcock employed a sponge retained obturator. From his contributions to the Medical Intelligencer for 1820⁴⁰, it is clear that Alcock regarded the disadvantage of the traditional instrument as being the poor fit obtained by the metal worker who swaged the device.

To improve the fit, Alcock obtained a wax impression of the palate by means similar to those employed by dentists, from which he poured a model. The pattern of the obturator was then made up on the model and cast by the lost wax process. (See figure 16).

This innovation, now a routine procedure, was derided by Snell.

"It is however, remarkable only for the very difficult manner in which the gentleman constructed it by casting. He was probably not aware that by a simpler process, a good artist would have made half a dozen of them in the time it must have taken him to construct it according to his method"⁴¹.

One can understand that Snell had a poor opinion of Alcock. At a time when Snell had realised the importance of attempting prosthetic repair of the cleft velum, his contemporary was describing a case of cleft hard and soft palates in which he was content to place an obturator in the hard palate defect and neglect the soft palate entirely. Moreover, Alcock was using an instrument of a basic design unchanged since the sixteenth century and had not discerned that an equal fault lay in the sponge as a long term means of retention.

4.8.4 James Snell (1796?-1850)

In common with Fox, Snell was a qualified surgeon with a special interest in problems of the mouth. It would seem that his interest in the teeth arose from his work on patients with palatal defects, for "A practical guide to operations on the teeth" was published in 1831⁴² whilst his articles on palatal defects first appeared in 1823⁴³. Unlike Fox, Snell was not associated with a teaching hospital, although he built up a collection of specimens and ran private courses at his residence⁴⁴.

Snell's exact year of birth was not determined. His obituary in the Medical Directory gave his date of death as 6th July, 1850 when he was supposedly in his fifty-fifth year⁴⁵. This would give his year of birth as either 1795 or 1796. Neither of these years could be correct as the minimum age for Members of the Royal College of Surgeons of England was 21 years⁴⁶ and Snell was admitted to membership on 1st September 1815⁴⁷.

The obituary notice also referred to Snell as a "man of great and varied talents". This would seem to indicate that oral matters did not absorb his entire professional career - an impression enhanced by the various addresses which appeared in the College List.

<u>LIST</u>	<u>ADDRESS</u>
1816	Packet Service
1820	Royal Navy
1821-1824	Chapel Street, Edgware Road
1825-1828	Crawford Street
1829-1833	Baker Street
1834-1841	No address
1842-1844	Royal Navy
1845-1850	East India Company Service

Thus Snell's dental activity in London was sandwiched between periods as a ship's surgeon. He died in the West Indies whilst in service with the East India Company.

4.8.4.1 Snell's Publications on the Palatal Prosthesis

Discussion of Snell and his work is fragmented in this study. This was necessary as Snell not only contributed to the recorded history of the obturator and artificial velum, but also made a significant advance in the design of the artificial velum. Thus this name inevitably recurs in the discussion of many aspects of the topic.

Prior to the appearance of the first edition of his book (1824)⁴⁸, Snell had made three contributions to the London Medical Repository. The first⁴³, which contained the only engraving the author published on cleft palate, (figure 17) dealt with the prosthetic treatment of a congenital

cleft in a young lady. The second⁴⁹, dealt with the provision of a prosthesis following exfoliation of five teeth and their associated alveolus: the third described an extensive prosthesis for a palatal defect occasioned by syphilis⁵⁰. All cases were included, inter alia, in the author's book.

There were considerable differences between the two editions of Snell's book. The first edition contained 40 pages and the second, 106 pages. Both were arranged in four principal chapters dealing with:

- i History
- ii Cases of congenital defect
- iii Defects occasioned by disease
- iv Defects of the os maxillae superiores.

i History. As mentioned in section 4.1, Snell reviewed his historical comments between editions. The second edition was thus more accurate than the first. However, neither necessarily referred to the first editions of the sixteenth and seventeenth century authors discussed. There was not the same need for review of the more recent publications and Snell's consideration of these contributions was changed little.

ii Interesting cases of congenital defects. In the first edition, the chapter contained three cases of prosthetic treatment, including an instance of hare lip supplied with an enamelled gold plate. The concluding observation noted that nature compensated for cleft palate by enlarging the tongue: this organ would feel confined when a palate was supplied⁵¹.

The same chapter in the second edition was considerably lengthened to include descriptions of surgical intervention including staphylorrhaphy. Snell was enthusiastic about this operation despite the failure of his own attempt⁵². He recommended operation at an early age and also the use of a heifers teat, with a leather guard attached, to aid feeding of the infant⁵³.

iii. Defects occasioned by disease. "Disease" in this context was a euphemism for "syphilis" as a subsequent chapter described the loss of portions from the palate and alveolus occasioned by abscess and other infections. Snell commented that no appliance was suitable in every case and described a selection of prostheses. The greater number in the second edition reflected the growth of his practice, whilst his treatment of the case which had been the subject of one of his earlier articles⁵⁰, had since gained the approbation of Astley Cooper⁵⁴.

iv. Defects of the os maxillare superioire. In common with the two previous clinical chapters, the opening case was one of those previously described in the London Medical Repository⁴⁹. The chapter was considerably enlarged in the second edition by the reprinting of a testimony by a fellow surgeon, Mr. Davies, to Snell's skill and generosity⁵⁵. The work concluded with mention of prostheses in the lower jaw and the provision of artificial noses. Following the text in the second edition, there was an advertisement for Snell's private courses in the provision of appliances⁴⁴.

4.8.4.2 Obturators Described by Snell

Snell described both obturators and soft palate prostheses; in many instances these were combined. Consideration is given to Snell's role in the development of soft palate prosthesis in section 6.2.2 of this work.

The appliance which was illustrated in the London Medical Repository of 1823⁴³ was dominated by an artificial vomer fashioned out of ivory (see figure 17).

Snell later substituted a gold vomer of two swaged plates. The importance of this component was to enhance the support given to the artificial palate which closed the defect in the natural hard palate. The latter plate was also of swaged gold.

Snell adapted his designs to the various needs of the patient. Acquired defects were covered by a gold or silver plate - obturator bulbs were not introduced within the void. The baseplates of the appliances were maintained in position by clasps engaging the natural teeth and it was noticeable that none of the appliances which were described was prepared for an edentulous mouth. Snell was cautious in his recommendation of the winged obturator (see figure 1) which could only be used where the pressure of the wings would not cause inconvenience⁵⁶. Where the metal was on display, as through a hare lip, Snell recommended enamelling to simulate the soft tissue. In cases where it was necessary to simulate lost alveolus, stained ivory or bone was employed: natural teeth were used as replacements.

4.9 Marie-Maurice Gariel

Inaccuracies in the recording of Gariel's work were alluded to in earlier sections of this work. Gaujot and Spillman attributed Gariel's design to Larrey⁵⁷ and Dorrance failed to draw a distinction between the application of Gariel's stud obturator and a similar one devised by Passavant⁵⁸. Possible explanation for both these inaccuracies were found when a contemporary description of Gariel's obturator was traced⁵⁹.

A weekly clinical review headed "New procedure to remedy the division of the soft palate" had been written by a Dr. "E. L." Gaujot and Spillman had assumed that these initials related to Larrey, an eminent surgeon of the time and one who was associated with treatment of the cleft palate⁶⁰. However, this surgeon's initial was 'H' and the index for the journal, whilst listing his name, gave no indication that he was responsible for the relevant article. Dorrance had probably assumed from the title of the review that it related to congenital cleft. This was not so, as the case history was that of destruction of the soft palate by an undiagnosed disease which the female patient had allegedly contracted from a foster child. Gariel had been requested to provide a suitable prosthesis, but the valved appliances which he designed had interfered with the patient's breathing. A Dr. Gosselin had then suggested modifications which had rendered the prosthesis wearable.

Dr. E. L. concluded his account of the case with an inadequate review of the current status of the palatal obturator. He claimed that dental treatises described only imperfect means of mechanical repair, but recalled an

American who had devised an appliance for his own use which had achieved "a certain degree of perfection". Dr. E. L. had been unable to find a description of this appliance, but he must have had in mind Charles Stearns' visit to Paris of 1846⁶¹. The obturator which Dr. E. L. did describe in some detail (he also provided an illustration) was one which Gariel had previously devised for simple perforations in the vault of the palate. Thus the illustration was unrelated to the case history reviewed and was of an appliance which would have been totally unsuitable in such an instance.

Gariel's obturator was of three discs of vulcanite luted together in such a manner as to form a stud, resembling that later used by Passavant in a contrasting situation⁵⁸.

4.10 Spiering's Obturator

A Dr. Spiering contributed a description of a simple palatal obturator to the medical paper, "Medicinische Zeitung" in 1946⁶². The wife of a factory worker who had been purged of syphilis was referred to Spiering for treatment of a large palatal defect $1\frac{1}{4}$ " by $\frac{3}{4}$ ".

Spiering knew of two conventional types of obturator which could be applied in such an instance. The first was the juxtaposed obturator, retained by springs (clasps) to the upper teeth. Spiering believed this to be the superior kind but it was not practicable in this instance because of the poor state of the teeth. For a similar reason a palate could not be supported by springs from splints around the lower molar teeth. The alternative form was the sponge

obturator, but the sponge would need to be of such a size as would occlude the nasal passages. A further stricture on the type of obturator which could be supplied was its necessary cheapness.

Spiering overcame these problems by sewing together two thin sheets of caoutchouc which were slightly larger than the defect. The stitching was accomplished in such a manner as to leave the edges of the sheets free, whilst the circle of stitching was rather smaller than the defect. When the obturator was placed in the mouth, the margin of the defect lay between the free edges of the upper and lower caoutchouc sheets. The patient was supplied with two of these obturators and instructed on hygiene measures. Because of the extreme cheapness of the material, it did not matter that the appliances tended to perish readily.

Although Spiering did not mention de la Barre, the type of juxtaposed obturator which was described was that which de la Barre had developed⁶³. The French dentist's views must have been respected in Germany at the time, for his juxtaposed obturator was also illustrated by Linderer, (1848)⁶⁴. The method of supporting an artificial palate from the lower teeth was also one which de la Barre had pioneered⁶⁵: Spiering quoted a later publication by Bailiff as his authority on this design however⁶⁶. No claims were made for the originality of the caoutchouc palate and Spiering indicated that similar ones had been recommended by Dieffenbach⁶⁶ and Allan⁶⁶ for defects of the soft palate.

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6. Guérini, V. A history of dentistry from the most ancient times to the end of the eighteenth century (Philadelphia and New York, 1909).
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23. Ibid., book IV, 128.
24. See section 3.15.4.
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30. See section 2.3.
31. Ebermaier, J.E.C. Taschenbuch der Chirurgie...2nd. ed. (Leipzig, 1810-11), 492-494.
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CHAPTER 5

THE PALATAL OBTURATOR IN THE WRITINGS OF THE 18TH CENTURY FRENCH SURGEON DENTISTS

5 THE PALATAL OBTURATOR IN THE WRITINGS OF THE 18TH CENTURY FRENCH SURGEON-DENTISTS

5.1 Introduction

Pamphlets and tracts on dental matters appeared many decades before the type of publication which might be recognised as a textbook for dental operators. For example, the British Dental Association library houses a pamphlet of 1587 written by Johannes Digitus¹. This short work (22 pages) was based on the writings of medical writers who had dealt with the care of the teeth and cures for toothache.

The first work which dealt comprehensively with all aspects of dental practice at a level suitable for the instruction of the specialised dental practitioner was published in 1728 by Pierre Fauchard². Several other treatises followed in the earlier part of the eighteenth century, for example, those by Gerauldy (1737)³, Hurlock (1742)⁴, Bunon (1743)⁵, Mouton (1746)⁶, le Cluse (1754)⁷ and Pfaff (1756)⁸. Fauchard's emulators of this period included only one (Bourdet -1757)⁹ who succeeded in producing a work of comparable scope and authority.

French authors, having initiated the dental treatise, continued to dominate its publication for the remainder of the eighteenth century. Their influence extended to the work of the earlier part of the nineteenth century.

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5.2 PIERRE FAUCHARD (1678-1761)

Those authors who have written notes on the history of the obturator mention two names more consistently than any others. One of these is Paré, the other Fauchard. Of the two, there is less scope for error when considering the work of Fauchard: there are two principal reasons for this. The first is that Fauchard, acclaimed for decades as the founder of modern dentistry, was closely studied within the profession; there was a special resurgence of interest at the bi-centenary of his death in 1961¹. The second reason is that he wrote only one major and carefully considered work, the original manuscript of which is still in existence. This work, "Le chirurgien dentiste" ran to two editions^{2,3}, and a German translation⁴ within Fauchard's lifetime.

5.2.1 Biography

Pierre Fauchard was born in Brittany in 1678⁵. There is no record of his early life and the first incident which was reliably recorded was Fauchard's entry into the French Navy at the age of 15 (1693). He was apprenticed to Alexandre Proteleret who, according to Campbell⁶, had a special interest in the teeth. Opinion is divided as to whether the apprentice surgeon ever went to sea, but he did leave the service and set up in dental practice in Angers in 1696. As was the custom of the time, Fauchard toured other towns in his professional capacity: these included Rennes, Nantes and Tours, but his work remained based in Angers. The surgeon Garengot's concurrent association with this

town was remarked upon in a previous section⁷, but whilst Garengeot could move on to Paris in search of further instruction, Fauchard had to continue to fathom and advance his own methods. By 1718 Fauchard's reputation was established and he moved to Paris.

The manuscript of "Le chirurgien dentiste" was completed in 1723 and was discovered in L'Ecole de Médecine in Paris in 1893. Further commentary was not made upon it until after its re-discovery in 1923⁸.

The writing of three separate hands is discernable in the manuscript. That which wrote the burden of the text was taken to be Fauchard's and one of the others, that of the surgeon de Vaux. Those commentators who cannot conceive that Fauchard's book compassed the experience of one man, claim that there is sufficient reason to believe that de Vaux co-operated with Fauchard in laying out the total dental knowledge of the time. The alternative and more prevalent view is that Fauchard wrote the basis of the work unaided: characteristic of his meticulous methods, he allowed the manuscript to rest for five years. During this period, he reviewed his writing and submitted it to others (including de Vaux) for their comments.

Fauchard had family connections with dentistry as his second wife, Elisabeth, was the sister of a Parisian dentist, du Chemin. However, Fauchard was the pre-eminent practitioner of his day; the success of his life's work enabled him to acquire a château, and be referred to as "Seigneur du Grand-Menil" in his death-notice⁹.

5.2.2 Fauchard's Obturators

Fauchard described five obturators in considerable detail. As Lindsay¹⁰ published an authoritative translation of "Le chirurgien dentiste" which is readily available, a new translation was not made for inclusion in this thesis. The three plates demonstrating the obturators are reproduced in figures 18, 19 and 20.

A comparison of first and second editions of "Le chirurgien dentiste" revealed only minor editorial differences in the text concerning the obturators. Chapter 22 dealt with the third and fourth obturators: in the first edition the text was continuous, but in the second edition the fourth obturator was described under a sub-heading¹¹. Chapter 23 described the fifth obturator. The first line of the chapter in the first edition erroneously referred to the obturator as the fourth¹²; a correction was made in the second edition¹³, although the legends for plate 40, figures 16 and 18, continued to refer to both the fourth and fifth obturators as the fourth¹⁴. The plates depicting all appliances were identical in both editions of the work.

Apart from Fauchard's confusion of the numbering of the five obturators, the text required a careful study to place the prostheses in correct chronological order; this did not correspond with the order of presentation. The fourth obturator was of the simplest design and was made, Fauchard states, several years before the third¹⁵. In turn, the third obturator was the prototype of the mechanical retention system developed in the remaining three prostheses¹⁶ and was thus the second in chronological order. This

obturator can be dated quite accurately. The first edition of "Le chirurgien dentiste" stated that the patient had been seen eight years previously¹⁷: this could either indicate 1715 or 1720 according to whether the year of completion of the manuscript or the year of publication was used as the baseline for the calculation. Reference to the second edition (1746) resolved the question as it was stated there that the patient had been seen about 25 years previously¹⁸. It may be inferred, therefore, that Fauchard designed his first mechanical obturator in 1720, after his move to Paris.

5.2.3 Resumé of the Relevant Chapters in "Le chirurgien dentiste"

(The numbering of the obturators is that which Fauchard conferred, not the chronological order).

Chapter 20¹⁹. The chapter opened with a general comment on the insufficiency of sponge retained obturators. There followed a minute description of the components of the first obturator with instructions on assembling the mechanism.

(See figure 18). Instructions were given for operating the retaining mechanism: a key raised and lowered the wings which rested upon the nasal floor when the appliance was in position.

Chapter 21²⁰. This shorter chapter described the second obturator, (see figure 18). The retaining device consisted of one fixed wing and a second which might be rotated by means of a key. Fauchard gave the indications for this prosthesis vis-à-vis the former one.

Chapter 22²¹. The obturators described in this chapter were the two early prostheses, the chronology of which was

discussed above. The third obturator was made of bone and metal, whereas the two obturators which were the subjects of chapters 20 and 21 were made entirely of metal (gold or silver). The palate section and teeth of the third appliance were carved from bone, whilst the retaining mechanism was of metal. (See figure 19). As with the first obturator described, the wings could be raised and lowered by means of a key. The point of contrast between the two designs was that the wings of the first obturator were driven directly by means of a screw thread, whilst the wings of the third mechanism were moved indirectly, a wedge being driven between the wings when the operating key was turned in the appropriate manner.

The fourth appliance was an innovation, being Fauchard's first attempt at combining an obturator with a denture. (Figure 20). The base and four teeth were carved from ivory (although Fauchard would have preferred to use narwhal tusk) and supported a sponge to obturate the acquired defect of the patient's palate. Retention of the appliance was aided by ligatures tied to the patient's canine teeth. Chapter 23²². The chapter contained a minute description of the fifth obturator. Comparison of figures 19 and 20 would suggest that the mechanisms of the third and fifth obturators were very similar. The wings of the fifth appliance were designed to rotate towards and apart from each other in a horizontal plane but the wings of the third obturator moved in a vertical plane. The posterior prolongation which was a feature of the third and fifth obturators ('M' in figure 19) was not an attempt at reproducing the

uvula, but a mechanical device to prevent antero-posterior rocking of the appliances. The perforations of the wings enable sponge to be sewn in position, thus reducing the ulceration of tissue against which they rested.

Although the obturator may bear witness to Fauchard at his most ingenious, we must not allow the stature of the man to lend a degree of practicality to his designs which they did not possess. It is not until one attempts to reconstruct moveable wing obturators from the original designs that it is realised how cumbersome the devices were. The arc of movement of the wings suggested a considerable defect and the appliances would have been unsuitable in many instances. la Forgue (1802) commented in a similar vein concerning the limited application of Fauchard's designs²³.

"I believe nevertheless that this father of dentists has found occasion to fit the obturators of which he gave us some models, for these diseases have infinite variation; but up to the present I have not been able to find the diseases to which they were suited".

5.2.4 Plagiarism by Felix Perez Arroyo

The Spanish dentist, Arroyo, published his "Tratado de las operaciones que deben practicarse en la dentadura" in 1799. The tenth chapter was devoted to the palatal obturator²⁴. In the course of this chapter, Arroyo described in some detail the method of construction of Fauchard's second and fourth appliances without, however, making any attribution to the originator. The illustrations of the two prostheses²⁵ were reproductions of Fauchard's own cuts.

Without a detailed knowledge of Arroyo's professional

background and political persuasions, the motives behind his plagiarism must remain the subject of speculation. By 1799, Spain had become closely bound politically to France by a series of treaties which had become progressively less advantageous to Spain. Moreover, French cultural influence was becoming increasingly important: Gariot, dentist to the weak-minded Charles IV of Spain, published his treatise of 1805²⁶ in French for example. Against this background, it would seem unlikely that the Spanish dental surgeons, for whom Arroyo's book was ostensibly produced, were totally unaware of Fauchard and his work. Even if they had no first hand knowledge of Fauchard's book, no 18th century French dental text of substance omitted to mention his name in connection with a wide scope of dental procedures. Thus, as Arroyo had little chance of escaping with the credit for originating the obturators which he described, his omission of Fauchard's name may have been a form of chauvenistic snub.

Against this contention may be set the argument that, had Arroyo wished to discredit a French dentist, he could have done so in a more effective manner by including a critical mention of Fauchard's three less practical designs, which were omitted from the text.

1. See: Bescombes, A. and Dagen, G. Pierre Fauchard père de l'art dentaire moderne (1678-1761) et ses contemporains (Paris, 1961).
Bescombes, A. 'Pierre Fauchard, le premier chirurgien dentiste'. Inform. dent. (Paris), 1961, 43, 847-852.
'Pierre Fauchard'. J. Amer. dent. Ass., 1961, 63, 229.
2. Fauchard, P. Le chirurgien dentiste (Paris, 1728), 2 vols.
3. Fauchards, P. Le chirurgien dentiste, 2nd. ed. (Paris, 1746), 2 vols.
4. Fauchard, P. Zahnarzt oder Tractat von d. Zähnen (Berlin, 1733), 2 vols.
5. Weinberger, B.W. Pierre Fauchard, surgeon-dentist (Minneapolis, 1941), p.3.
6. Campbell, J. M. From a trade to a profession, byways in dental history (Privately published, 1958). See "Pierre Fauchard" pps. 50-57.
7. See section 4.2.
8. Weinberber, B. W. Introduction to the history of dentistry (St. Louis, 1948), 2 vols., I, 307.
9. Ibid., I, 311.
10. Fauchard, P. translated by Lindsay, L. The surgeon-dentist (London, 1946).
11. Fauchard, (n.3), II, 318.
12. Fauchard, (n.2), II, 317.
13. Fauchard, (n.3), II, 324.
14. Ibid., pps. 337 and 338.
15. Fauchard (n.2), II, 311; (n.3), II, 318.

16. Fauchard (n.2), II, 302; (n.3), II, 309.
17. Fauchard (n.2), II, 310.
18. Fauchard (n.3), II, 317.
19. Fauchard (n.2), II, 285; (n.3), II, 292.
20. Fauchard (n.2), II, 294; (n.3), II, 302.
21. Fauchard (n.2), II, 302; (n.3), II, 309.
22. Fauchard (n.2), II, 317; (n.3) II, 324.
23. la Forge, L. L'art du dentiste (Paris, 1802),
p.377.
24. Arroyo, F.P. Tratado de las operaciones que deben
practicarse en la dentadura (Madrid, 1799), 209-216.
25. Ibid., plate 4.
26. Gariot, J.B. Traité des maladies de la bouche
(Paris, 1805).

5.3 ETIENNE BOURDET (1722-1789)

There was only one writer who could link Fauchard to Bourdet in the prosthetic field and that was Mouton. His work, "Essay d'odontotechnie....." of 1746¹, was the first specialised prosthetic text but omitted mention of the palatal obturator. Similarly, a German contemporary of Bourdet, Phillip Pfaff, published an authoritative work in 1756 but also omitted reference to the palatal obturator².

There were two Bourdet brothers who were engaged in the practice of dentistry; Etienne was the elder and achieved greater distinction than his brother, Bernard. Etienne rose to the position of Royal Dentist to Louis XV (1762) and retained the post under Louis XVI. At his death on October 12th, 1789, Bourdet was succeeded in his appointment by du Bois-Foucou³. Etienne Bourdet's first published work, "Operations, sur les dents" (1754), was followed in 1757 by "Recherches et observations sur toutes les parties de l'art du dentiste"⁵. The latter work, published in two volumes, was very similar in scope and format to Fauchard's earlier work. It was in "Recherches et observations...." that Bourdet recorded details of his obturators.

5.3.1 Bourdet's Account of the Obturator

Bourdet's presentation of his material on the palatal obturator was reminiscent of the medical writers of the sixteenth and seventeenth centuries, in that it took the form of several observations or amplified case histories.

His discussion opened with the causes of acquired palatal defect: scurvy, venereal disease and incautious application of mercury⁶. The embarrassments to patients

included difficulties in speech and swallowing with regurgitation through the nose. Bourdet regarded the obturator as the acme of the dentist's art and classified two types, simple and compound.

The simple obturators were suitable for small defects and consisted of a plate placed over the hole (see figure 21, fig. 4). The plate was fitted with lateral branches to standing teeth: each branch was perforated so that it could be tied by threads to the appropriate tooth. The compound obturators were those having a component which entered the defect. They were undesirable because they represented an obstacle to healing, but were necessary for the repair of larger defects.

Observation 1. In 1752 Bourdet was asked to treat a patient whose acquired defect had been exacerbated by the over zealous application of mercury⁷. When the carious bone had separated, Bourdet provided a simple obturator which enabled the tissues to heal so well that the plate could be discarded.

Observation 2. This treatment related to a patient from Bordeaux who had been treated locally for venereal disease⁸. The palatal defect was extensive as the crista galli of the sphenoid and the vomer had been lost. The patient had been treated by a dentist and a toymaker in Paris, neither of whom could provide an adequate appliance. Bourdet prepared a simple plate obturator with a drainage hole for mucus to pass to the throat: this was attached by gold wire to a molar on one side and a premolar on the other.

Observation 3. In January 1754, Bourdet had to refer a patient with a palatal defect of venereal origin to another dentist due to pressure of work⁹. To his chagrin, his colleague prepared an obturator pressing into the defect which could not therefore reduce in size.

Observation 4. In June, 1752 Bourdet treated a woman who had been attended by three other artistes in 11 years¹⁰: none of the obturators which had been supplied would stay in position and Bourdet designed the appliance depicted in figure 22 for her. F.3 illustrates the components to the best advantage. The plate MM closed the defect and was attached to a smaller plate KK which was introduced into the defect. A section of the upper plate, L. was hinged at P and could be opened and closed by the screw, N operated by the key, F.4: this was the retaining mechanism. F.1 illustrates the canal, DD, which ran from the tip of the upper plate to the base of the lower and was designed to drain away mucous.

Observation 5. In May 1751, a patient presented with a sponge retained obturator which had enlarged the palatal defect¹¹. Bourdet provided the mechanical obturator depicted in figure 21 (F1 and F2). The plate AA closed the defect, whilst the smaller plate BB was introduced into the nasal cavity. The lateral plates DD elevated to engage the nasal floor and were restricted in their movement by the 'T' bars LL (F.2). F.3 illustrates the larger plate pierced by the end of the screw, P, which could be rotated by a key to operate the retaining mechanism by lowering the upper plate.

Bourdet considered that his obturators were comfortable enough to be worn without sponge linings: he criticised Fauchard in this respect - what was achieved in replacing a sponge retained obturator with a mechanical appliance lined with sponge? The offensive odour would remain in evidence. In his closing remarks, Bourdet commented that his obturators could easily be combined with either a partial or a complete upper denture.

One may judge that Bourdet made two significant advances. Firstly, he recognized that the smaller palatal defects tend to reduce in size on healing and that the operator should not discourage this by introducing a complicated mechanism into the defect, when a simple covering would suffice. It was pointed out that Bourdet was not the first to advise simple coverage¹², but he played an important rôle in popularising the principle.

Secondly, Bourdet designed the obturator, which was the subject of Observation 5, in such a manner that the entire upper plate could be raised and lowered. This mechanism would seem to provide firmer anchorage than would be possible with either of Fauchard's rotating flaps or elevating wings.

1. Mouton, C. Essay d'odontotechnie ou dissertation sur les dents artificielles. (Paris, 1746).
2. Pfaff, P. Abhandlungen von den Zahnen des menschlichen Körpers und deren Krankheiten (Hildesheim, 1966). A facsimile reprint of the Berlin 1756 edition.
3. Weinberger, B.W. Introduction to the history of dentistry (St. Louis, 1948), 2 vols., I, 316-317.
4. Bourdet, E. Operations sur les dents (Paris, 1754).
5. Bourdet, E. Recherches et observations sur toutes les parties de l'art du dentiste (Paris, 1757), 2 vols.
6. Ibid., II, 274.
7. Ibid., II, 278.
8. Ibid., II, 282.
9. Ibid., II, 285.
10. Ibid., II, 287.
11. Ibid., II, 290.
12. See section 3.14.4.

5.4 ANSELME LOUIS BERNARD BRECHILLET JOURDAIN (1734-1816)

Jourdain possessed the qualification of "Dentist-received at the College of Surgery"¹, an achievement which Etienne Bourdet and du Bois-Foucou were also proud to proclaim after their names. Jourdain's principal interest lay within the branches of dentistry now encompassed by oral surgery and oral medicine. Thus, considering the quantity of his literary output, mechanical dentistry played a minor rôle in the texts. In one of his earlier publications dealing with surgery of the jaws, Jourdain illustrated plates which could be attached to the teeth to hold medicaments in contact with the palate². Mention of prostheses was incidental to the text of his best known work, "Traité des maladies et des operations.....de la bouche..." (1778). It was not until a late, joint publication with Maggiolo (1707)³ that detailed reference was made to mechanical procedures: this was confined to the production of dentures and probably represented Maggiolo's contribution to the text.

5.4.1 Jourdain's References to the Obturator

A translation into English of "Traité des maladies et des operations..." was made in 1849⁴. The translation was severely edited in parts and embellished in others, by the insertion of current American practices, which in the mirror of posterity, appear more distorted than Jourdain's original text. For serious study, therefore, the translation was to be avoided.

Jourdain paid considerable attention to the palatal defect in "Traité des maladies et des operations....". The full title to the work, which included the phrase "suivi de

notes, d'observations et de consultations interessantes,
tant anciennes que modernes", held the clue to Jourdain's
handling of his material. In discussing the aetiology
of palatal defect, Jourdain gave syphilitic and non-syphilitic
causes culled from a wide variety of authorities including
Wanderviel, Zacutus, Lusitanus, Munniks, Hildan, Tulpius,
Severinus, Ruysch, Paré, Guy de Chauliac and Duvernay⁵.
The twenty-six examples of the treatment of palatal disease
which were given came from a range of sources in addition
to Jourdain's own experience. He recommended prepared
sponge⁶ (? sponge soaked in wax, as mentioned by la Forge)⁷
solely to maintain the patency of drainage.

An original obturator which Jourdain described was
necessary for the treatment of the patient detailed in the
seventh observation⁸. A young and irreproachable lady had
been referred to Jourdain with non-syphilitic perforations
of the hard and soft palates. After treatment of the acute
phase, she was supplied with an obturator which Jourdain
described, briefly, as follows:

"The sufferer then spoke nasally and food passed into
the nose. To obviate this inconvenience, I had con-
structed a plate of gold, having a branch on each side,
which I attached to the teeth nearest the disease".

The legend for the illustration⁹ (see figure 23) was
equally terse:

"Figure 6. A folding plate with a hinge and bolt to
dress wounds of the palate, when there are teeth on each
side.

AA. The extent of the plate.

BB. The hinge.

C. The bolt.

DD. The branches which sprout to right and left and attach themselves to the closest teeth to the wound".

This presentation should be contrasted with that of the more mechanically orientated authorities (Fauchard¹⁰, Bourdet¹¹) who would surely have entered into greater detail. The bias of Jourdain's interest was also illustrated by a comparison of the detail in which he described his medical handling of the case and the brief reference to the obturator.

Jourdain's ninth observation¹² was the case of Laurent Toupin, taken from Fabry's work¹³. The lengthy course of treatment was faithfully related, true to Jourdain's penchant.

The nineteenth observation¹⁴ was an account of an operation by M. Anselin in which a tumour was removed from the palate. Mention was made of an apparatus contrived by M. Anselin to staunch the haemorrhage by compression, but Jourdain's lack of respect of mechanical devices precluded further description.

The twenty-sixth observation¹⁵ included the reference to Tulp which was discussed in an earlier section¹⁶, and the chapter concluded with an account of Jourdain's discussion with M. Levrette on the nature and treatment of congenital cleft lip and palate: this is also referred to in other sections^{17,18}.

1. Jourdain, A.L.L.B. Traité des maladies et des operations réellement chirurgicales de la bouche, et des parties qui y correspond (Paris, 1778), 2 vols., I, title page.
2. Jourdain, A.L.L.B. Traité des depots dans le sinus maxillare, des fractures, et des caries de l'une et l'autre machoire (Paris, 1760), plate 1, facing p.64.
3. Jourdain, A.L.L.B. & Maggiolo,-- Le manuel de l'art du dentiste (Nancy, 1807).
4. Jourdain, A.L.L.B. A treatise on the diseases and surgical operations of the mouth and parts adjacent, translator anon. (Baltimore, 1849), (Philadelphia, 1851).
5. Jourdain, (n.1), I , 340-341.
6. Ibid., I, 403.
7. See section 5.6.1.
8. Jourdain (n.1), I, 409 and plate 2.
9. Ibid., I, 534.
10. See section 5.2.3.
11. See section 5.3.1.
12. Jourdain (n.1), I, 411.
13. See section 3.9.3.
14. Jourdain (n.1), I, 428.
15. Jourdain (n.1), I, 442.
16. See section 3.11.4.
17. See section 2.3.
18. See section 5.6.10.

5.5 NICHOLAS du BOIS (1753-1824) AND JEAN-JOSEPH du BOIS (1747-1830)

Nicholas du Bois and Jean-Joseph du Bois were contemporary Parisian dentists of note. They were unrelated, but their interests came into confrontation over one aspect of their work at least, that of mineral paste teeth. Nicholas became known professionally as du Bois de Chemant and Jean-Joseph as du Bois-Foucou, operator for the teeth to Louis XVI.

Weinberger¹ gave an account of the early development of mineral paste: there were patent inaccuracies in this account (e.g. the vitrifying temperature for the minerals), but it presented the rôles of the principals involved and evoked the spirit of the times. An apothecary, du Château, conceived the idea of a procelain denture which would be impervious to saliva. His work was recognised by the Academy of Surgery (1776) but floundered because of du Château's ignorance of the dental art. By 1787, du Bois de Chemant had modified du Château's supposed secret recipe and in 1789 presented his work to the Academy of Surgery. du Bois-Foucou was a member of the committee which examined the invention: the report was unenthusiastic, the teeth were unhealthy and further experience was required. The Academy of Sciences took a more favourable view and de Chemant was able to obtain a 15 year patent from Louis XVI for the manufacture of his mineral teeth. du Château, du Bois-Foucou and some associates contested the patent in the courts but were unsuccessful.

The atmosphere of the French Revolution was not one

in which to capitalise upon innovation, other than political, and de Chemant transferred his practice to London (Frith Street, Soho), where he had taken our further patents². du Bois-Foucou remained in Paris and in the more stable times of 1808 recanted from his stand against procelain teeth. An ironic situation occurred when a committee of the Academy of Surgery meted out the same disapproval of du Bois-Foucou's developments in this sphere as he had been instrumental in obtaining against de Chemant's innovations.

5.5.1 de Chemant's Obturators

In 1797, de Chemant published a book on his work from his London address⁴. In the text he gave an account of a patient who was sent to him in Paris by the surgeon, Desault⁵. The patient was wearing a sponge-retained obturator which he had difficulty in manipulating and which emitted a foul stench. de Chemant prepared a plate of mineral substance which "answered in the most complete manner". The patient's voice was more sonorous with the mineral obturator as, de Chemant explained, there was no sponge to absorb the sound. Amongst the letters of approbation appended to the book was one from Mr. Young, a surgeon⁶. It confirmed that M. de Chemant had provided a young man with a most satisfactory obturator retained partly by ligatures and partly by its inherent shape.

The 1797 volume carried a plate illustrating two obturators and an artificial velum (see figure 24). This plate had been re-engraved by the 1804 edition and only one obturator was shown. de Chemant modified his comments on the obturator by addition of the note that there were some cases which merited the use of gold, fine silver or platinum in preference to his mineral substance; the criteria were

not given⁷. The fifth edition of the text (1816)⁸ carried the same pagination and was identical in respect of the obturators.

Due to this move to London, where his principle publications were made, de Chemant received no recognition from those French authors who reviewed progress in obturator design⁹. James Snell, however, mentioned that:

"M. de Chemant in 1815, constructed an obturator for a soldier who had lost a portion of the Os Maxillare composed of mineral paste and retained in its situation by ligatures around the bicuspid¹⁰."

As no reference could be found for a publication by de Chemant in the London medical press of 1815, it was surmised that Snell was writing from memory and had perpetrated errors in spelling and chronology. The soldier must have been the gentleman referred to by Mr. Young in his letter, published as early as 1797, and not a young hero from the battlefield as inferred by Snell.

5.5.2 du Bois-Foucou's Obturator

In 1801, du Bois-Foucou presented a paper on the use of obturators for the soft palate¹¹. He was concerned with acquired defects rather than congenital ones and did not allow the title of his communication to confine his discussion to appliances for the soft palate. He pointed to the designs of Fauchard and Bourdet, which were suited to the hard palate, and commented that acquired defects were no less liable to occur in the soft palate. He did not agree with those who advised against obturating such defects on the grounds of irritation and was wary of those designs

which utilised the teeth for retention. To avoid loosening of the teeth, du Bois-Foucou favoured the use of the nasal floor for retention of devices. Gold and platinum were the only suitable materials; silver oxidised, gum elastic gave an offensive odour and sponge tended to enlarge the defect.

In 1780 du Bois-Foucou had communicated to the Academy of Surgery details of an obturator designed for the occlusion of a perforation of the soft palate. Twenty-one years later, he had again encountered the patient involved and it was probably this incident which inspired the further communication. The appliance had to be retained by the teeth, but du Bois-Foucou designed a simple plate to cover the defect with extended, zig-zag arms to the clasped teeth. (See figure 25, Fig.2). By this means the torsion exerted by short, rigid arms (as in Bourdet's design) was overcome. Although the appliance had been worn for twentyone years, du Bois-Foucou was perturbed that one of the molar teeth had been loosened to the point where it was about to be exfoliated: he broached a suggestion, made by the patient, that an artificial penetration of the hard palate might be effective in retaining an appliance and preserving the teeth. The editor of du Bois-Foucou's contribution added a substantial note against this proposal.

Cullerier later suggested a modification of the design, in which a light hemisphere (of unspecified material) would be held in the defect by a metal support, in preference to the covering plate¹². Cullerier may have felt that an improved seal was necessary, but he admitted that he had

insufficient experience of the proposed modification.

Snell applied the principle of the elongated, zig-zag, flexible connector in a different manner. As an alternative to placing the clasps on the end of the zig-zag strip, Snell placed them at the extremities of a more rigid bar which traversed the palate. A zig-zag connector passed posteriorly from the centre of this bar, carrying the obturating plate to the soft palate¹³. Both systems, that of du Bois-Foucou and that of Snell, were designed to allow movement of the soft palate without the transmission of torque to the retaining teeth. In one instance Snell covered the metal obturator with wash leather to prevent ulceration of the subjacent tissue¹⁴.

1. Weinberger, B.W. Introduction to the history of dentistry (St. Louis, 1948), 2 vols., I, 372.
2. de Chemant, N. du Bois 'Artificial teeth'. Patent 1803 for 1791 in Owen, G. Government specifications of dental patents (London, 1862), 2 vols., I, 17-20. This is probably a unique collection of dental patents housed in the Royal Society of Medicine library.
3. Weinberger (n.1), p. 375.
4. de Chemant, N. du Bois. A dissertation on artificial teeth (London, 1797).
5. Ibid., p.15.
6. Ibid., p.34.
7. de Chemant, N. du Bois. A dissertation on artificial teeth (London, 1804), p.38.
8. de Chemant, N. du Bois. A dissertation on artificial teeth (London, 1816).
9. The authors are reviewed in section 5.6.
10. Snell, J. Observations on the history, use and construction of obturateurs, 2nd. ed. (London, 1828), p.18.
11. du Bois-Foucou, J.J. 'De l'usage des obturateurs du voile de palais'. Rec. period. 1801, 11, 27-34.
12. Cullerier, M.J.C. 'Obturbateur' in Dictionnaire des sciences médicales (Paris, 1819), 60 vols., XXXVII, 59-67. See p.64.
13. Snell, J. Observations on the history, use and construction of obturateurs (London, 1824), p.38.

14. Snell, J. 'The case of double perforation through the palatal portion of the maxillary bone with fissure of the soft palate and destruction of the uvula mechanically supplied'. London med. Repos., 1849, new ser., 1, 488-490.

5.6 THE EIGHTEENTH CENTURY IN RETROSPECT

The phase of rapid and concentrated innovation engendered by Fauchard and Bourdet left little in the way of original design for others to describe. The rate of publication on dental and oral matters continued to gain in momentum however. The combination of these circumstances meant that more and more authors were describing identical prostheses in similar terms: some accounts embraced the author's particular experience with one form or another. The first half of the nineteenth century thus produced a number of reviews of obturator construction which bore a strong resemblance: the current practice which these reviews presented was one having its origins firmly in the eighteenth century.

5.6.1 Louis la Forge

la Forge's work entitled "L'art du dentiste" (1802) was divided into a number of parts, the fourth of which was devoted to "obturbateurs et palais artificiels"¹. la Forge recommended that such prostheses be prepared for those of a firm constitution, as they were better able to wear the appliances for prolonged periods. Sponge obturators should be attached to a wire to aid in removal and impregnated with wax (prepared sponge) to reduce water absorption and the foetid odour.

The advantages of placing a plate over the hole in the palate and holding it in position by attachment to the teeth had been known for some time (Bourdet's name was not mentioned in this context). The material employed varied

according to the wealth of the patient and ranged from tortoiseshell and cattle-horn to gold: threads were preferable to wire for attachment to teeth. It was an advantage for the obturator not to fit too closely as it then lasted longer and gave rise to less inflammation.

la Forgue recommended soldering a shallow cylindrical eminence to the plate covering the defect (see figure 26, no. 105). This eminence should conform to the defect, but not press upon the sides or depth of the hole. In place of the metal eminence, one of gum elastic or cork might be used. There was no stated advantage for this style of obturator, but the notion was, presumably, to improve the seal of the obturator, without precluding the reduction in size of the defect by cicatrisation. la Forgue's description was later taken up by other writers and acquired the appellation of obturator "à chapeau"².

Under a separate heading of "Some obturators which one removes each day or many times each day", la Forgue again dealt with sponge, sponge and metal and those appliances retained in position by standing teeth. Where natural teeth were not available to retain the obturator, other means were necessary and at this juncture the remark critical of Fauchard's more extravagant designs was made. (This was quoted in section 5.2.1.). la Forgue believed that the best mechanism for a self retaining obturator was the turning bolt (see figure 26, nos. 106-108): a bolt bent at a right angle was rotated from the oral surface to engage the nasal floor. Where there was a large defect, more than one bolt might be required (see figure 26, no. 109). It was

necessary to border the plate with sponge or gum elastic to obtain a seal. Those appliances extended into the maxillary sinus could be retained by bolts curved to the required degree: these should engage bony undercuts as soft tissue was incapable of resisting the bolts adequately.

The operation for hare lip might include the removal of a "prominent part" (the premaxilla) together with the associated teeth. A suitable obturator would be a flexible metal plate lined with sponge or cork, carrying replacement human teeth. (See figure 26 no. 110).

la Forgue concluded his remarks upon the obturator with a telling paragraph. The wars of the times and the Revolution had caused horrible loss of tissue from the mouth and palate. He had seen men who had survived a bullet in the mouth with defects of one or both jaws, sabre blows piercing the sinus and a bayonet through the palate.

5.6.2 M.J.C. Cullerier

In 1804, Cullerier contributed a paper to the Journal général de médecine³ which was the precursor of a later and better known article in the "Dictionnaire des sciences médicales" (1819)⁴. The historical content of these two contributions has already been analysed⁵, but Cullerier's material also included eighteenth century and contemporary examples of obturator design. There was little significant difference between the 1804 and 1819 writings.

Cullerier attributed the simple 'U' shaped spring obturator to an anonymous, early 18th century writer (see figure 1, nos. 11 and 12, also figure 27 nos. VII and VII bis). The similarity between these designs and that suggested by

Solingen has already been indicated⁶. Whatever the origin, Cullerier did not approve of the concept, which he explained, lead to pain, inflammation and enlargement of the defect.

du Bois-Foucou's design was commented upon⁷ and a description of an obturator which Verdeil had reported in the Journal de médecine of 1776 was repeated. In this latter report, a patient, who had suffered the loss of his nose, hard and soft palate as a result of a syphilitic erosion, had cut a sponge to the shape of the palatal defect. The sponge was covered by morocco leather and an elastic silver plate simulating the uvula had been added. The silver plate was prevented from ulcerating the fauces by a border of sponge.

Cullerier had criticised Fauchard's elevating wing pattern obturators for their bulk, lack of mechanical sophistication and sponge lining. Having failed with an obturator of du Bois-Foucou's pattern in 1803, Cullerier had turned to a jeweller's mechanic, Codan, for assistance. Codan had provided two obturators which were retained by elevating wings. In the first, illustrated in figure 27 nos. VIII, VIII bis and IX, the wings were attached by hinges to a cylinder on the nasal aspect of the obturating plate. The cylinder could be raised and lowered by manipulating the button 'B' (figure 27 no. VIII bis) on the oral side of the plate. Manipulation of the button was facilitated by the provision of especially designed forceps (figure 27 no. X and X bis).

The second of Codan's obturators was a more complicated contrivance and unique for its bulk on the oral aspect. (Figure 27, nos. XI - XIII, also figure 28). The following

description of the components and Cullerier's experience of its use was translated from the author's repeat description of 1819⁸.

"1. A plate of 18 or 20 lines length of 12 to 14 lines in width, convex to the nasal face and concave at the palatine face.

2. Another plate having less spread than the preceding one, scalloped in the middle of its posterior border, concave on the side which faces the first plate, to which it is united, lightly convex to the tongue side. This plate is pierced by a hole to lodge the square pivot which must be turned by a watch key, to effect a lowering of the wings.

3. A valve in the form of a small plate, (held) in front of the hole I have described by a rivet-screw, able to move to left and right to close the hole.

4. A raised piece of triangular form almost heart-shaped, placed in the scalop of the lower plate and replacing uvula.

5. Two flattened stalks, continuous with the preceding piece, 10 or 12 lines long, fixed between the two plates and leaning on the uvula.

6. Three wings articulated by joints and formed of metal wire.

7. A cylindrical stalk, a movable nut and a retractable screw. One can see that this instrument is not only an obturator but also a complete palate, or almost complete. The large plate replaces the vault of the palate, the movable piece, situated at the posterior part, takes upon itself the uvula and soft palate (function) and directs

the bolus towards the pharynx during swallowing, opposes its entry to the nasal passages and modifies the air (flow) in the emission of sounds.

I have said, in describing other obturators that the palatine face should be concave, but in this one there is a light convexity. The reason for this is that, on the simple obturator, the mobile part of the palate exerts a substantial effect which it does not have if all the partition is of metal. This action of the palate combines with the movement of the tongue for swallowing; but when the tongue alone is mobile, it becomes necessary that the surface opposing this organ facilitates the sliding of the food prepared by mastication and the rounded surface gives this facility.

In the two previous palates, the plate which replaced the vault was concave, and the bolus, pressed by the tongue, was lost in part, in the concavity, swallowing was slow and incomplete. It was after this inconvenience that I believed the natural form had to be done away with, and this change has had all the desired success. The wings were open worked and made of metal wire (strip) so as not to slip on the smooth, narrow border; this resulted in the inconvenience of the development of subjacent tissue into the spaces of the wings, rendering it difficult to remove the instrument to clean it; but a thin plate soldered on the wings eradicates the projections made by the metal wire, and prevents the cellular tissue from engaging too much as before".

5.6.3 J. B. Gariot

Gariot published his "Traité des maladies de la bouche" in 1805 and included in the text a section dealing with the palatal obturator⁹. The work was translated for the American Library of Dental Science series in 1843¹⁰, but the text relevant to the present discussion was edited and abridged, consideration of winged obturators and artificial soft palates being omitted.

Gariot advised the use of wax for taking an impression of the defect and the production of a plaster cast on which to fashion the obturator. The device could be of gold, platinum or silver, but such was the degree of perfection which had been achieved in design that the dentist or surgeon had to ask a watchmaker's mechanic to fashion the prosthesis. Discussion of the various forms of obturator was then divided by a useful classification, an innovation which was subsequently adopted by following authors:

- i Sponge Obturators. The method of attaching the sponge to the obturating plate by a screw and cup was preferable to stitching. However, as this genre seldom held in place, emitted a bad smell and damaged the edge of the defect, they had been abandoned.
- ii Obturators fixed to teeth. Gariot agreed with Bourdet that defects reduced in size during cicatrisation, but eventually achieved a constant size. du Bois-Foucou's design was referred to as an appliance of this class.
- iii Obturators with a spring. This was the device which Cullerier had mentioned (see figure 27, nos. VII and VII bis). The mechanism was simple but damaging,

requiring force for removal.

- iv Movable wing obturators. Included in this category were the rotating wing type, introduced by Paré and modified by Fauchard, and the sliding bolt variety. The former were suitable where the length of the defect was greater than the width. The latter design would furnish a retaining projection at any section of the periphery of the obturating plate. The projection was operated by a slide on the oral aspect. Gariot recommended this category of appliance as simple and efficient; it was not liable to damage the tissues if correctly made on an accurate model.
- v Mechanical obturators. This was the term which Gariot chose to describe appliances with two wings movable in the vertical plane. He mentioned two appliances of this type made for the dentist Chaussard and this allusion appears to be unique.
- vi Artificial Soft palates. The appliance made for Cullerier by Codan was described in this section. The prosthesis was more properly a combined obturator and soft palate with the latter component playing a minor rôle: however, Gariot described no alternative form of soft palate prosthesis.

5.6.4 Monsieur Touchard

The superficial resemblance of Touchard's name to that of Fauchard later led to some confusion on the part of English speaking investigators and chroniclers. The confusion was bred of insufficient background knowledge and a resolute refusal to believe that the French could correctly

quote the names of their compatriots. For example, Bond, when translating le Foulon's work into English, came upon "Fauchard" and "Touchard" in connection with the discussion on combined dentures and obturators¹¹. In the translation, both these names disappeared in favour of "Fouchard", a true compromise for whose genesis Dr. Bond was responsible.

Touchard presented the design of a combined "obturateur-dentier" to the Société de Médecine. The design was published in 1814¹² and, as it subsequently attracted comment in de la Barre's work of 1820¹³, Touchard's appliance was reviewed in those resumés by other authors which referred to de la Barre's writing¹⁴. The prosthesis was contrived as an improvement to Fauchard's concept and was fabricated for a patient who had sustained a defect of the palate, one inch in diameter, whilst languishing in a "damp prison" for a prolonged period. (The reference lettering in the following description applies to figure 29).

The appliance was made in two parts. The obturator (d.f) was of gold, concave into the defect. Seahorse bone (narwhal) was formed to the shape of the alveolar bone lost due to the disease and was stained to simulate the gum. The two parts were mutually adapted and locked by the projection of gold, (j). Two gold strips (g and h) extended from the base to engage the palatal aspect of two molar teeth and retain the appliance in position.

The Société de Médecine appointed du Bois-Foucou and Duval to evaluate Touchard's appliance¹⁵. They pointed out that Fauchard, Bourdet and la Forgue had described similar obturators and the assessors were concerned that the retaining

devices would have an adverse effect on the natural teeth involved. Nevertheless, the obturator merited a place in the Society's archives as it illustrated the huge improvement in surgical prosthesis since the age of Paré and Thévenin.

5.6.5 Monsieur Gerbaux

Gerbaux compiled a small volume for the edification of parents, child nurses and those of the public who wished to benefit from such knowledge. Originally published in Belgium in 1816, a translation into English appeared in 1817¹⁶. This carried no reference to the obturator, but the extended editions of 1823 and 1824¹⁷ advised the reader that obturators must be close fitting and not impair nature. The most perfect were those which bore upon the teeth or those with movable wings, where teeth were not available to retain the appliance.

5.6.6 Christophe-Francois de la Barre (1787-1862)

In Fauchard and Bourdet could be discerned the apprentice-trained background, with its fascination for technical minutiae, tempered by clinical observation and experience. Jourdain leaned towards the surgical aspects of his calling and was influenced by the traditional methods of presenting clinical experience as used by the sixteenth and seventeenth century authorities. de la Barre, a trained physician and royal dental surgeon¹⁸, relished technical detail. This was in complete contrast to Jourdain's view. de la Barre wrote:

"To be a good mechanical dentist it is necessary to possess exact notions on two rather different arts, medicine and mechanics"¹⁹.

This conviction was amply displayed in the scope of his publications, the range of which may be illustrated by two titles: "Opening discourse of a dental medicine course" (Paris, 1817) and "Treatise on the mechanical aspect of the surgeon-dentist's art". (Paris, 1820). The standard was set for this latter work by de la Barre's submission that the works of Bourdet, de Magiolo, la Forgue and Gariot furnished precise information, but were grossly incomplete²⁰.

5.6.6.1 de la Barre's Descriptions of Palatal Obturators

de la Barre dealt with the obturator in Chapter 8 of "Traité de la partie mecanique....." under several headings²¹.

- i The sponge obturator. This was largely an historical account²² and de la Barre concluded that these devices were "most defective"²³.
- ii Winged obturators. de la Barre mentioned that winged obturators had been introduced by Fauchard to replace the offensive sponge, but the account was uncritical and did not record that Fauchard's appliances were garnished with sponge to reduce trauma.
- iii Juxtaposed obturators. de la Barre had been completely convinced of the correctness of covering a defect by a simple plate. He praised Bourdet's innovation and listed the disadvantages of those devices which derived retention from the defect.
- iv Juxtaposed obturators with ligatures. The concept of the juxtaposed obturator was excellent, the problem was retaining the prosthesis in position; ligatures damaged the gums.

- v Juxtaposed obturators with "elastic springs". de la Barre favoured the use of a juxtaposed obturator "à chapeaux", which meant that the flat plate of the obturator was fitted with a shallow prominence or crown. (See figure 30). The prominence fitted into the defect to improve the seal of the appliance. The metal "elastic springs" used to maintain the device in position were the equivalent of present day clasps. de la Barre soldered a rest or spur to each clasp: the spur engaged the tooth and prevented the clasp from sinking beneath the gingival margins as ligatures tended to do. The preparations of the appliance required an accurate cast to work upon: de la Barre gave a recipe for a caoutchouc preparation which, he claimed, provided a suitable medium for impression taking.
- vi Obturator complicated by a denture. de la Barre felt that Fauchard's combined obturator and denture was too heavy and complicated to be of any practical use. A comprehensive description of Touchard's appliance was given, but de la Barre agreed with the reviewers in the *Journal général de médecine* that the lateral retaining plates would displace the retaining teeth¹⁵. (Touchard's combined appliance was designed for a partially edentulous mouth, Fauchard's for an edentulous mouth). du Bois de Chemant's mineral paste appliance also received a mention and de la Barre acknowledged the benefits of the material: however, the prosthesis was retained by ligatures with their attendant disadvantages.

vii Complete palate carrying a denture. de la Barre included in this category those prostheses which replaced teeth, hard and soft palates. His own designs were typically of a platinum base carrying mineral paste teeth. The soft palate and uvula could be of hinged metal plates, but de la Barre preferred the use of gomme élastique for these parts. The appliance was maintained in position by springs attached to a frame around the lower teeth.

de la Barre described and illustrated one particularly ingenious, probably impracticable, appliance with a soft palate moved by the tongue²⁴ (Figure 31). A hole was cut in the anterior part of the palate to which a diaphragm was fitted. A system of levers was extended from the nasal aspect of the diaphragm so that when the tongue contacted the palate on swallowing, the soft palate was raised. Food and drink were thus prevented from entering the nasal fossae.

5.6.7 J.C.F. Maury

Although Maury's account (1828)²⁵ of the contemporary obturator was very much in line with those of la Forge and de la Barre, his opening remarks on the subject displayed a sign of the changing times. Drawing attention to Roux's recent surgical endeavours, Maury confined his remarks on prostheses entirely to those suited to the treatment of acquired defects. He regarded the treatment of congenital defects as entirely the province of the surgeon.

The categories of obturator described by Maury are illustrated in figure 32. They embraced the sponge (no.11),

denigrated for its foetid odour, and the branched obturator (no. 8). The latter was described elsewhere as the juxtaposed obturator²⁶, fabricated according to Bourdet's principle of covering the defect and gaining retention from adjacent teeth.

The button obturator (no. 12) was a rigid, self retaining device with a low projection entering the defect. The projection was made to a slightly larger diameter than the defect, thus it would have enlarged the hole rendering retention transient.

Unlike Gariot, Maury did not group bolt and moving wing obturators together, but set them in distinct categories. The nasal surface of the bolt obturator is illustrated in figure 32 no. 9. The winged obturator (nos. 1-7) was illustrated in assembled and component form, demonstrating either Maury's approbation or fascination of the mechanism. (Perhaps both). Maury's was a miniaturised contrivance, compared with Fauchard's. The screw (no.6), operated from the mouth, raised and lowered a cantilever (no.4) which in turn operated two flaps or wings (nos. 3, 5) which were pivoted to the base of the obturator. The flaps were of a plate construction and therefore avoided the problem of the proliferating nasal mucosa, observed by Cullerier, around open-worked flaps.

Maury made an original contribution to the now traditional final class of combined denture-obturators. His design (no. 13) was of a metal base bearing clasps to two remaining natural molars and carrying "incorruptible" (mineral paste) teeth attached by pivots. The obturator

was a simple extension of the base to cover the defect. The appearance of these appliances may have been enhanced from the labial aspect by the addition of enamelled gum work, which Maury also described.

5.6.8 J.M. Alexis Schange

The short title of Schange's work, "Précis sur le redressement des dents...."²⁷ does not reveal the entire content of the volume. The orthodontic sections of the text were followed by "quelques reflexions sur les obturateurs du palais". The work was obviously a popular one as it completed three editions in the consecutive years 1840-1842. Schange described himself as a médecin-dentiste²⁸, indicating the background of a physician. His views on design aspects of the palatal obturator marked the point in the nineteenth century where the influences of the eighteenth were finally subordinated. A brief reflection upon Schange's designs (figure 33, 34 and 35) demonstrates that he was a man ahead of his time. In as much as he forsook mechanical extravagances for a simplicity of design derived from basic principles, he was a man for all time.

Schange criticised Fauchard's winged obturators on the grounds that they enlarged the perforation. He had witnessed a case with Tavaux where the perforation had enlarged to the extent that the entire prosthesis penetrated into the nasal fossa²⁹. The modifications to Fauchard's original designs were not successful and the bolt obturators were of less benefit than Paré's turnbuckle design. Schange described the obturator à chapeau as a "capital vice". He had seen one which also carried replacement teeth with pegs

forced into the root canals of truncated, natural incisors. This was not a practise which was to cease through Schange's condemnation, however ³⁰.

Schange quoted from Cullerier (Dictionnaire des sciences médicales), Sanson and Begin (Dictionnaire abrégé des sciences médicales) and Lagneau (Dictionnaire de médecine) to demonstrate the universal and ill conceived recommendation for winged and mechanical devices introduced within the defect. Those who supplied such prostheses thought only of short-term expedients; the hyperplastic changes which the prostheses engendered might well prove pre-cancerous³¹.

Schange agreed with de la Barre that a juxtaposed obturator would favour healing. He was critical of de la Barre's "springy compressors" as a means of supporting and retaining the obturator and developed clasps and occlusal rests evocative of present day practice. Figure 34 (13) illustrates Schange's improvement over de la Barre's concept and represents an obturator made to cover a syphilitic lesion when sponge and winged obturators, provided by others, had failed. A further case history related how Schange fabricated a gold plate 7cm x 5cm to cover a defect occasioned by the loss of the left maxilla. The appliance was retained by three teeth on the right side of the mouth³².

Schange advised that the contour of the palate should be restored exactly by the artificial replacement. He did not necessarily agree with Petit, who was of the opinion that a greater convexity promoted the healing of the defect. Indeed, the tendency was for such an obturator to accumulate nasal secretions.

In writing of combined obturators and dentures, Schange denigrated those which were constructed of metal and hippopotamus ivory. The ivory was insufficiently durable to form the alveolar portion and the entire prosthesis should be fabricated in swaged gold. Schange detailed his method of constructing dies and counters to swage the palatal and alveolar forms, which were then soldered together. Mineral paste teeth were necessary to ensure the overall durability of the prosthesis. An example of this type of prosthesis is illustrated in figure 34 (14).

Schange was so confident in the stability of the appliances he was able to produce, that he also illustrated the combined palatal and nasal prosthesis which he had provided for a syphilitic patient in 1838³³. (Figure 33).

5.6.9 J. le Foulon

le Foulon's treatise on the theory and practise of dental surgery was first published in Paris in 1841³⁴. The translation of the work made by T. E. Bond¹¹ for the American Library of Dental Science (1844) was closer to the original text than many of the translations of that series. This relative fidelity was probably due to the proximity of the publication dates of the original and translation; there was little scope for editing on the grounds of advancement in technique. Nevertheless, Bond contrived some anomalies in translation, one of which was discussed earlier in this text³⁵.

le Foulon's analysis of the obturator followed the now well-established pattern of classification. The sponge obturator was roundly condemned and an illustrative case

recorded by Baillif (of Berlin) was quoted³⁶. In this instance, a sponge obturator had been responsible for considerable further destruction of a defective palate. le Foulon unfairly attributed Gariot with recommending sponge obturators. Whereas this author certainly described such appliances, he firmly stated that they should be considered obsolete.

le Foulon also decried wing, bolt and spring obturators for the damage they were capable of inflicting. He promoted Bourdet's concept of the juxtaposed obturator and suggested that the size of the prominence on the fitting surface (according to de la Barre's modification) should be reduced by the provision of successively smaller obturators, thus encouraging healing.

le Foulon described two classes of combined obturator and denture: "Obturator complicated by a denture"³⁷ and "Complete palate carrying a denture"³⁸. In the former class Touchard's appliance was described in preference to Fauchard's (which was mentioned). le Foulon aligned himself with the strictures which the contemporary reviewers placed upon Touchard's design. The account of his second class of appliance was influenced heavily by de la Barre's writing: all his prostheses relevant to the section were described. le Foulon was particularly impressed by the use of mineral paste and de la Barre's method of supporting the upper appliance from bands attached to the lower teeth³⁹, a technique which he emulated (figure 36).

le Foulon's final category of appliance, for use

where there was destruction of both palate and velum, was also taken from de la Barre.

5.6.10 Malagou Antoine Desirabode (1781-185?)

The final retrospective review of the obturator of the eighteenth century was also the most comprehensive, although less critical than the account given by Schange. Desirabode first published his "Nouveaux elements complets de la science et de l'art du dentiste" in 1843. The following views were taken from the 1845 edition of the work⁴⁰. The American Library of Dental Science published a translation in 1847⁴¹: for reasons previously expounded, this translation was not relied upon for analysis.

Desirabode set aside the precise and rather narrow classification of prostheses which had been built up in successive contributions of the early part of the century, culminating in le Foulon's. Desirabode resolved the forms of obturator into three broad categories:

- i Maxillary obturators.
- ii Palatine obturators.
- iii Maxillo-palatine obturators.

The disadvantage of this system was that the titles were insufficiently descriptive of the appliances they embraced. Although Desirabode included the traditional material one had become accustomed to reading, there were also allusions to contributors not found elsewhere. By the standard of the age, the account was well referenced.

i Maxillary obturators². In all other reviews the appliances of this section were referred to as "dentures complicated by obturators" or a similar term. Commenting

that Fauchard's obturators had neither the precision or lightness of those currently provided. Desirabode defended Fauchard against de la Barre's statement that all Fauchard's obturators were retained by mechanisms within the defect: one example was retained by ties to the adjacent canines. (See figure 20). This was not to infer that Desirabode approved of Fauchard's appliances; he did not, nor did he find that Fauchard's contribution was a significant improvement. A prosthesis should be carved from hippopotamus ivory and retained by clasps, such as that presented to the Royal Academy of Medicine by Delestre. (This was probably in 1841, but a report could not be traced).

- ii Palatine obturators⁴³. Commenting that Fauchard's palatal obturators had pressed upon the margins of the defect, Desirabode illustrated how practitioners had sought to overcome this problem by devising bolt, button and branched (juxtaposed) devices. At this juncture, there was an interesting lapse in the accuracy of Desirabode's discussion. He spoke of the obturators à chapeau as similar to the gold plate advised by Jourdain. He gave a reference for Jourdain's plate - I, 449.

In the elaboration of this division of the work, it was demonstrated that the term obturateur à chapeau was a colloquialism conferred on a form of juxtaposed obturator modified by the addition of a low crown or prominence to the fitting surface. The term was adopted because the prosthesis resembled a hat with brim

and crown.

The reference which Desirabode gave to Jourdain's work related to the latter's discussion with Levrette on the nature and treatment of congenital cleft palate in the child. Jourdain had dispensed with the idea of a sponge obturator in such circumstances and devised a gold plate bearing a bifurcated stalk. The stalks passed through the palatal defect, were exteriorised through the nostrils and recurved against the cheeks. The stalks were then attached to the child's bonnet, in much the same fashion as a modern orthodontist achieves anchorage from a head cap. (Figure 37). Thus Desirabode, equating hat with bonnet, committed an error of interpretation.

Desirabode repeated Schange's analysis of the obturator designs which had appeared in the contemporary medical dictionaries. He concluded that these were at variance with current dental thought, which favoured juxtaposed plates. At this juncture Desirabode's discussion passed onto the rôles of the prosthesis in assisting surgery. Desirabode's name was totally neglected by those who later discussed this topic⁴⁴.

iii Maxillo-palatine obturators⁴⁵. This category related to those appliances designed to replace the maxilla and palate and which presented diverse requirements, individual to the particular problem. Desirabode described one such prosthesis in which the defect was filled by an obturator and the palate reconstructed by a gold plate. Hippopotamus ivory was used to reconstitute the lost

gums and the appliance was held in position by clasps to the remaining natural teeth. Schange's recommendation that the entire prosthesis should be of swaged metal had either had insufficient time to percolate current thought or had proved too damaging.

1. la Forge, L. L'art du dentiste (Paris, 1802), 365-382.
2. See section 5.6.6.1. heading v, also section 5.6.8.
3. Cullerier, M.J.C. 'Memoire sur les obturateurs du palais avec la description d'un nouvel instrument de ce genre'. J. gén. Méd., 1804, 12, 12-36.
4. Cullerier, M.J.C. 'Obturateurs' in Dictionnaire des sciences médicales (Paris, 1819), 60 vols., XXXVII, 59-67.
5. See section 1.2.
6. See section 3.15.3, also figure 1 (12).
7. See section 5.5.2.
8. Cullerier (n.4), 65-66.
9. Gariot, J.B. Traité des maladies de la bouche (Paris, 1805), 323-338 and plate 13.
10. Gariot, J.B. Treatise on the diseases of the mouth, translated by Savier, J.B., (Baltimore, 1843), 156-158.
11. le Foulon, J. A new treatise on the theory and practice of dental surgery, translated by Bond, T.E., (Baltimore, 1844), p.446.
12. Touchard, -. 'Description d'un obturateur-dentier'. J. gén. Méd., 1814, 50, 386-393.
13. de la Barre, C.F. Traité de la partie mecanique de l'art du chirurgien-dentiste (Paris, 1820), 2 vols., I, 307.
14. See Schange, section 5.6.8., le Foulon, section 5.6.9. and Desirabode, section 5.6.10.
15. du Bois-Foucou, J.J. and Duval, J.R. 'Rapport sur l'instrument précédent'. J. gén. Méd. 1814, 50, 393-396.

16. Gerbaux, -. On the teeth, anonymous translation (Edinburgh, 1817). The title page carries the information quoted concerning the date and place of the original publication.
17. Gerbaux, -. On the teeth, anonymous translation (London, 1823 and 1824), 164-165. (Two editions with identical pagination.
18. de la Barre (n.13), title page.
19. Ibid., I, 6.
20. Ibid., I, 16.
21. Ibid., I, 298-318.
22. See also sections 1.4 and 3.7.4.
23. de la Barre (n.13), I, 300.
24. Ibid., I, 310-312.
25. Maury, J.C.F. Traité complete de l'art du dentiste (Paris, 1828), 2 vols., I, 344-352.
26. See section 5.6.6.1.
27. Schange, J.M.A. Précis sur le redressement des dents ou exposé des moyens rationels de prevenir et de corriger les deviations des dents; suivi de quelques reflexions sur les obturateurs du palais. (Paris, 1840).
28. Ibid., title page.
29. Schange, J.M.A. Précis sur redressement des dents... 2nd. ed. (Paris, 1841), p.151.
30. See section 6.4.1.1 and figures 77 and 102.
31. Schange (n.29), p.157.
32. Ibid., p. 164.
33. Ibid., p. 172.

34. le Foulon, J. Nouveau traité theorique et pratique de l'art du dentiste (Paris, 1841).
35. See section 5.6.4.
36. le Foulon (n.34), p.441. See also section 4.10 for an additional reference to Baillif.
37. Ibid., p. 446.
38. Ibid., p. 448.
39. Ibid., p. 450.
40. Desirabode, M.A. Nouveaux éléments complets de la science et de l'art du dentiste 2nd. ed. (Paris, 1845), 2 vols.
41. Desirabode, M.A. Complete elements of the science and art of the dentist, translated by *---A---* (Baltimore, 1847). See pages 518-537 for section on the obturator.
42. Desirabode (n.39), II, 744.
43. Ibid., II, 747
44. See chapter 7.
45. Desirabode (n.39), II, 769.

5.7 THE PERSISTENCE OF CERTAIN EIGHTEENTH CENTURY DESIGNS

Practical experience eliminated the use of the more extravagant and damaging obturators and modified the detailed design of others. There were few prostheses recommended in recent years which did not originate, in concept, from the eighteenth century or before. Advances in technique and materials lead to greater sophistication, but the essence of the designs remained identical.

5.7.1 Compressible Materials

The disadvantages of sponge as an obturating medium have been amply stressed. The molecular structure of any compressible or elastic material must be of a loose nature and therefore porous to oral fluids. If the designer accepts this and plans accordingly, such materials may yet be of value.

Watt (1957)¹ designed an obturator for use in the edentulous patient, where there was an unoperated cleft. The obturator was of rubber latex and was not only self-retaining but was of adequate proficiency to retain a complete upper denture in place. The obturator and denture were united by studs set in the denture base: thus, when the latex of an obturator bulb began to foul, it could be removed and replaced by another held in store.

Watt's system held the advantage over others of the time (e.g. Windecker²) in that the compressible bulb was not of a material processed directly to the denture base.

5.7.2 The Winged Obturator

The earlier condemnation of the winged obturator by Schange, le Foulon and Desirabode did not prevent Charrière from miniaturising the mechanism. Charrière was a well-known French producer of surgical prostheses in the mid 19th century: his obturator was described and illustrated by Gaujot and Spillman (1872)³, who were cautious in their recommendation of it. (Figure 38).

Charrière appears to have been the last serious protagonist of the design until McNeil⁴ refurbished the concept in 1948. McNeil designed his appliance for manufacture in acrylic resin. The wings were raised and lowered by means of a wire loop which ran within the thickness of the denture base from the wing pivot to the outer aspect of the buccal flange, where the patient could manipulate the mechanism. Figure 39 illustrates an obturator of this type where the patient elevated or depressed the wings by manipulating a molar tooth on the denture.

5.7.3 Support from the Lower Teeth

The notion of supporting an upper denture by two springs from the lower counterpart was an early one. de la Barre in particular developed this technique, which was emulated by Maury (figure 40) and le Foulon (figure 36). When there were standing lower teeth, splints could be prepared around the natural lower teeth to bear the springs. Figure 41 shows that Preterre⁶ continued this practise, whilst figure 42 demonstrates a modern counterpart from the 1960's. In the latter instance, an overlay was incorporated to help compensate for a lack of forward and downward growth

of the maxillae. This feature is associated with cleft of the palate and is more pronounced following some forms of surgery.

5.7.4 Base Extension

The complete coverage of the palate by a denture base is not the most pleasant of sensations for the patient. Where clinical factors (such as the provision of support) do not play an over-riding rôle, the patient may be more comfortable if a small defect is simply covered by an extension from a discrete base plate. Figure 32 (13) illustrates Maury's approach, which is in no way different from the modern cobalt-chrome appliance illustrated in figure 43.

1. Watt, D.M. 'Cleft palate in edentulous patients'.
Brit. dent. J., 1957, 102, 253-267.
2. Windecker, D. 'Die Methodik des Frankfurter
Obturator's'. Dtsch. zahnärztl. Z., 1956, 11, 848-858.
3. Gaujot, G. and Spillman, E. Arsenal de la chirurgie
contemporaine : description mode d'emploi et appre-
ciation des appareils et instruments (Paris, 1872),
2 vols., II, 26-27.
4. McNeil, C.K. 'Congenital cleft palate'. Brit. dent.
J., 1948, 84, 137-141.
5. de la Barre, C.F. Traité de la partie mecanique de
l'art du chirurgien dentiste (Paris, 1820), 2 vols.,
II, figs. 181-198.
6. Prettere, A. 'De la prothèse buccale'. Bull. Acad.
roy. Méd. Belg., 1861., 2nd ser., 4, 699-725.
7. Maury, J.C.F. Traité complete de l'art du dentiste
(Paris, 1828), 2 vols., II, pl. 31.

CHAPTER 6
SOFT PALATE PROSTHESIS

6.1 INTRODUCTION

Kingsley (1877)¹ drew attention to the difference between a palatal obturator and an artificial velum. The former was a simple cover, plug or bulb which occluded congenital or acquired defects of either hard or soft palates. The latter was a sophisticated and specialised prosthesis which was employed in the treatment of open-ended (congenital) defects of the soft palate.

Kingsley's concept of an artificial velum was only one means of tackling the problem of the open ended defect of the soft palate. His distinction between the two major types of palatal prostheses was nevertheless a valid one, both from descriptive and physiological viewpoints.

Obtulators applied to circumscribed defects of the soft palate were described earlier in this work. The principles of design adhered to by Houllier,² Gariel,³ and du Bois Foucou⁴ were in no way different from those found in corresponding prostheses for the hard palate. The discussion in this division of the thesis relates to those appliances designed for open-ended soft palate defects, which are considered according to the following classification :-

- i. Flap velum.
- ii. Artificial velum.
- iii. Bulb obturators.

Of these three classes, the artificial vela and bulb obturators were associated with theories of muscular

activity in relation to appliance function. On this basis, flap vela might be regarded as empirical. They were designed simply as laminae which overlayed the cleft and were maintained against the soft tissue by an innate or conferred spring pressure.

1. Kingsley, N.W. 'Obturators, ancient and modern!' Johnstons dent. Misc., 1877, 4, see p.361.
2. See section 3.8.2.
3. See section 4.9.
4. See section 5.5.2.

6.2 THE FLAP VELUM


Well before the hinged or flap velum was introduced for the prosthetic treatment of congenital clefts, it had become an established feature of those combined obturators designed to occlude acquired defects involving both hard and soft palates. Appliances by Jourdain¹ (1778, figure 23), Cullerier² (1804, figure 27 XIII), de la Barre³ (1820, figure 31) and Schange⁴ (1840, figure 35) were mentioned and illustrated in this context. Placed in amongst these appliances chronologically were those of the same genre which Snell⁵ designed in 1823 for a congenital defect (figure 17) and that which de Chemant illustrated in 1797 (figure 24).

6.2.1. C.-F. de la Barre

The chapter in de la Barre's text of 1820, which carried the description of the combined obturator/flap velum for a large acquired defect, also included a subsequent article on a prosthesis for the congenitally cleft soft palate.

de la Barre favoured the practice of staphylorrhaphy in suitable cases and stressed the importance of the uvula. His text then continued:⁶

"The art does not possess the means to remedy the absence of the uvula alone. It is not the same with the absence of the entire soft palate. I have found occasion to apply an imitation from which the sufferer has obtained the same advantages that we derive from that bestowed by nature ; here is the description : a

plate bent back in the manner to form a , embraced the posterior part of the naso-palatine floor; the nasal portion was sufficiently indented to accommodate the vomer. The palatine portion formed a vault, on each side of which arose a stalk going to fix itself to the first molars, by means of small flexible arcs to which I had attached some spurs similar to those of which I have spoken in describing the palatal obturator.

"This framework has no other purpose but to serve to support a sheet of caoutchouc rendered very thin with the aid of a strong compressive force acting on it, when this substance is plunged into boiling water. The sheet, to which I gave the form of the soft palate and the uvula, was joined to the framework by little pins with oval heads. This simple contrivance rendered all the services of the soft palate itself: however, it is much less perfect than that which is adapted to the palate, carrying a denture, of which I have spoken in another passage." (See figure 31).

An author who writes of his prostheses in terms of relative perfection is exercising subjective judgement. The criterion by which the above comparison was made could only have been mechanical sophistication.

6.2.2 James Snell

Snell's combined prosthesis for congenital division of the hard and soft palate was alluded to in an earlier section.⁵ The engraving reproduced in figure 17 does not illustrate the soft palate aspect of the prosthesis well. Snell originally recommended that this component should

consist of an upper and lower plate of India rubber (b and c in fig.2) which embraced the palatal remnants and occluded the defect.⁷ The artificial uvula (e) was attached by a gold spring to the baseplate. The design was subsequently simplified by replacing the three flaps of rubber with a single, larger flap.⁸ This was positioned on the oral aspect of the defect and extended over the borders of the defect onto the palatal remnants.

A subsequent patient with a similar palatal defect was provided with a modified prosthesis.⁹ The flap of "prepared elastic gum" was hinged to the gold base. The flap was further divided by a transverse hinge into soft palate and uvula.

6.2.3 A. Preterre

Preterre's role in Europe was equivalent to Kingsley's in America. Their respective interests in palatal prosthesis were kindled within six years of each other. Kingsley's first case was in 1860,¹⁰ whilst Preterre wrote that his own work in the field started on his arrival in Paris in 1854; by 1862 he could state:

"My labours have already obtained the award at seven different Exhibitions of medals and certificates of honour, the highest distinctions at the disposal of the jury.

An engraving of each of the pieces exhibited belongs to a work on Oral Prosthesis illustrated with more than one hundred woodcuts - Lesions and Restorations - is under press and will appear shortly."

Preterre was writing in a bi-lingual pamphlet he

produced in support of his exhibit at the London International Exhibition of 1862.¹¹ The work he referred to as being in print was his "Traité des divisions congénitales ou acquises de la voûte du palais et de son voile", which apparently did not appear until 1867.¹² Gaujot and Spillman¹³ reproduced a number of Preterre's illustrations from this text. Other of the engravings had been published in earlier communications by Preterre¹⁴ and Debout.¹⁵

For exhibition purposes, Preterre naturally chose his more elaborate prostheses. These included post resection appliances and restorations for the complicated mutilations of war (specifically, the Crimean and Italian campaigns). The mechanical complexities of his appliance were the absorbing aspects of Preterre's work, his writings did not display the same regard for the muscular function of adjacent parts as those of Kingsley. Consequently, Preterre's design of appliance for a particular problem was based on mechanical expediency. This led to the production of a variety of soft palate prostheses of the flap and artificial velum types. Kingsley, on the other hand, was bound by his dogma of muscle function in relation to appliance design and, once he had developed his artificial velum, his prostheses tended to be of a uniform style.¹⁶

In describing his appliances to the Royal Belgium Academy of Medicine, Preterre¹⁴ explained that his velar prostheses usually consisted of a base of contoured metal supporting soft caoutchouc strips. The latter were designed to replace the elasticity of the soft palate and were supported by flat helical springs. Figures 44 and 45

demonstrate a style of velar flap favoured by Preterre. The more elaborate prosthesis illustrated in figure 45 depicts all those features to which Preterre drew attention. The principal means of supporting the velum was by the bulb 'C' which was itself supported on a cantilever arm from the coiled spring 'A', mounted in the palatal defect of the hard palate.

Preterre admitted that speech, whilst intelligible, retained nasal qualities when the patients were using the prostheses he had designed for them. Debout, a distinguished French surgeon who admired Preterre's work, stressed the necessity of supportive speech therapy.¹⁵

6.2.4 Three London Vela of the 1850's and 1860's.

Whilst Preterre in Paris and Kingsley in New York were developing and fitting their complicated velar prostheses, the pervading attitude in London was far more conservative.

In 1857, Sercombe¹⁷ presented a paper to the Odontological Society in London on the prosthetic treatment of cleft palate. Figure 46 typifies the style of prosthesis which he recommended. The hard palate defect was covered by a swaged gold plate clasped to natural teeth. The posterior edge of this plate was perforated to allow two sheets of soft rubber to be stitched onto it. The lower piece was tongue-shaped and thick, supporting the very thin and much wider upper sheet. The dotted lines in 'B' indicate the stitching around the thicker piece of rubber and across the posterior aspect of the metal plate. The combination of the two rubber sheets acted as a simple valve

to seal off the soft palate defect.

Sixty years later the virtue of the thin velar flap was still recognised by Elfert,¹⁸ even if he could only recommend it where operation had been omitted or was unsuccessful. Elfert was opposed to "thick, immobile defect closures of hard or soft rubber". He devised a vulcanite bridge which spanned the palate and was clasped to natural teeth. A thin ($\frac{1}{2}$ mm) rubber plate was attached to this bridge and was trimmed to the desired form.

Williams¹⁹ was moved to re-affirm the desirability of the simple flap after having been present at Kingsley's London address of 1864. Williams did not believe that it was possible to obtain a plaster impression of adequate extent to build Kingsley's artificial velum and recommended a simple flap of soft rubber hinged to a swaged gold plate (figure 47). Williams had encountered a tissue reaction to the sulphuretted mercury pigment employed in the soft vulcanite and had accordingly reverted to unpigmented (black) material. This was an easier remedy than that suggested later, in 1870²⁰, in which the flap was lined with aluminium to prevent adverse tissue reaction to the pigment.

Parkinson²¹ had gained an interest in the treatment of clefts whilst house surgeon to William Fergusson. He wrote that he had supplied forty-eight vela of the pattern he recommended in 1867 (figure 48). Parkinson lay stress on the durability of his prosthesis: the velar portion was of hard rubber and was hinged to the swaged gold base: a gold spring maintained the flap in contact with the soft tissue. The appliance should not be fitted to a child

less than twelve years old and sixteen was young enough. For reasons he did not explain, Parkinson felt that the hinge was unnecessary in cases of acquired defect.

Parkinson's velum was reproduced in Cole's book²² and continued to attract support twenty years later when Bates²³ again drew attention to the concept.

The use of springs in this manner to provide elastic recoil for the velar flap was a popular feature of many designs. Martinier and Lemerle²⁴ illustrated a prosthesis of this type which they attributed (erroneously) to Kingsley. Their illustration would fit descriptions by Newland-Pedley²⁵ or two other authors (Otto de Bole and Buhler) quoted by Gaujot and Spillman.²⁶

6.2.5 "Fish Tail" Style of Flap Velum

A rather obvious feature of Ambroise Paré's prosthetic restorations for appendages such as arms and hands was their resemblance to the armour of the period. Having witnessed the delicately articulated filletting of the finger joints one might wonder why Paré did not design a flap velum on the same principle.

The notion was current in America and London some three centuries later, however. Charles Stearns was fitted with such a velum during his youth²⁷ and subsequently witnessed a similar appliance in the mouth of a patient who had been attended by Nasmyth.²⁸ Both were failures. The Ruppes (amongst others) recorded that Guérini exhibited this style of flap velum at the Paris International Exhibition of 1900.²⁹ (See figure 49). The system was too heavy to function adequately and Guérini's case must be an anathema

to those, such as A.L. Rowse,³⁰ who argue that a sense of history is essential if we are to avoid the errors of our forebears. Guérini was a prominent dental historian.

6.2.6 Leon Delair and the Ruppes

The artificial velum and bulb obturators were created according to theories of palatal and pharyngeal muscle activity during speech. The flap velum did not have such an auspicious origin, but early in the twentieth century there were those who believed that the flap had a greater physiological potential which should be harnessed.

Delair's flap (figure 50) was based on the following precepts:

- i. There should be a metal base, for this gave better resonance than vulcanite.
- ii. The velum must be soft and resilient.
- iii. There should be complete mobility between base and velum.
- iv. The flap should extend from the anterior pillar of fauces to contact the pad of the superior constrictor muscle of the pharynx.

Delair expanded on his design in three articles,³¹
32,33. The only impression which was taken was of the hard palate. The velum (or valve as Delair termed it) was fabricated from soft rubber and was designed with convex borders according to a number of measurements. These were obtained from the patient's mouth by a series of compasses especially designed by Delair. The velum was hinged to the metal base and could be readily replaced.

The Ruppes³⁴ modified the procedure by preparing a

hard vulcanite base with a short, hinged velum bearing a wire loop on the posterior border. The loop was adjusted in the mouth and soft wax was then placed upon it so that the pharyngeal form could be moulded in situ. The wax was replaced by vulcanite to complete the appliance. (Figure 51).

The Ruppes did not give details of the region of pharyngeal musculature which it was desirable to record. Their method was obviously derived from Calvin Case³⁵, but as the flap velum covered the palatal remnants (cf. Case's appliance, figure 86), the contact of the Ruppe flap velum with the posterior pharyngeal wall would have been lower than the level recommended by Case and the level which is regarded as correct to-day. Thus, despite the intricacies of their technique, it is doubtful if the Ruppe appliances were any more beneficial than the flap vela of empirical length illustrated in figures 52 and 53.

6.2.7 Muscle Controlled Velar Flaps

The use of a spring to maintain the velar flap in contact with the soft palate remnants gave insufficient control for some designers. By providing vertical flanges to the lateral margins of the flap or by grooving the margins, these designers sought to place the movement of the flap under the muscular influence of the soft palate remnants. It should be emphasised, however, that these movements were not analogous to the complex variation in the three dimensional form of the soft palate which designers of artificial vela sought to emulate: the movement of the muscle controlled flap velum was confined to the vertical

plane.

Figure 53 illustrates a soft rubber obturator and flap velum made in England between the two World Wars. The lateral grooves accommodated the margins of the hard palate defect and the soft palatal remnants. The muscular influence which could be exerted upon the long flap which passed down (rather than across) the oropharynx must have been negligible.

Payne (1921)³⁶ hinged a soft vulcanite velum to a metal plate. (Figure 54). The elastic band prevented the flap from sinking away from the control of the muscular remnants, which grasped the two vertical projections.

Mitchell (1917)³⁷ designed several hinged flap vela of hard vulcanite. Figure 55 illustrates one such design: note the high flanges on the lateral aspect of the flap for muscular control. Mitchell's inclusion of the vomer renders the prosthesis evocative of Snell's design conceived 94 years earlier. (See figure 17).

In concluding consideration of the flap velum, an overall impression must be recorded. The exhaustive reports of discussion between adherents of the Kingsley concept (artificial velum) and the Suersen concept (bulb obturator), provided evidence that these two factions were giving consideration to the physiological effect of their respective prostheses. This, in general, was not the aura which surrounded proponents of the flap velum. The justification for a velar flap (where given) was usually its simplicity compared with an artificial velum and that it appeared to work well in practice.

It was also regrettable that some ostensibly authoritative English lecturers were so ill-versed in their subject. Heath,³⁸ an eminent surgeon in the field of palatal repair, whilst lecturing at University College in 1882, illustrated Stearns' velum as that of Kingsley and attributed Stearns with the production of a flap velum. Bennett³⁹, lecturing at the Dental Hospital of London in 1898, described Stearns as an English surgeon who first used a simple velar flap "about 1847". He referred to Kingsley as an "American medical man".

These were not simply errors of interpretation or misunderstandings. As will become manifest from the evidence presented in sections 6.3.2 and 6.3.3, only an individual with the most slender of background knowledge to his subject would make such statements.

1. See section 5.4.1.
2. See section 5.6.2.
3. See section 5.6.6.1, heading vii.
4. See section 5.6.8.
5. See section 4.8.4.2.
6. de la Barre, C.F. *Traité de la partie mécanique de l'art du chirurgien-dentiste* (Paris 1820), 2 vols., I, 314.
7. Snell, J. 'Case of extensive congenital division of both the hard and soft palates successfully treated by mechanical means.' *London med. Repos.* 1823, 20, 365-367.
8. Snell, J. *Observations on the history, use and construction of obturators* (London, 1824), p.24.
9. *Ibid.*, p.30.
10. See section 6.3.3.2.
11. Preterre, A. *Mechanical maxillo palatine prosthesis.* (A bilingual pamphlet produced in support of Preterre's exhibit at the International Exhibition of London, 1862, Parisian section, no.1756).
12. Preterre, A. *Traité des division congenitales ou acquises de la voute du palais et de son voile* (Paris, 1867).
13. Gaujot, G. and Spillman, E. *Arsenal de la chirurgie contemporaine: description, mode d'emploi et appreciation des appareils et instruments* (Paris, 1872), 2 vols., II, 38-39, 42-49.
14. Preterre, A. 'De la prothese buccale'. *Bull. Acad. roy. Med, Belg.*, 1861, 2nd ser., 4, 699-725.
15. Debout, -, 'Prothèse de la restauration de la division

15. congenitale, de la v^oûte du palais et de son voile:
parallel de moyen prothetiques et des procèdes auto-
plastique.' Bull. gen. Therap. Med.Chir., 1861, 61,
519-527 and 62, 39-48. Translated and republished
as : 'On the restoration of congenital fissure
affecting the hard and soft palate, with a comparison
of the resources individually offered by prosthesis
and autoplasty.' Dublin quart.J.med.Sci.,1862,33,
490-512.
16. See sections 6.3.3.3. and 6.3.3.4.
17. Sercombe,E. 'Cleft palate: its surgical and
mechanical treatment.' Tr. odont.Soc.London,1856-7,
1st ser., 1, 75-100.
18. Elfert,-. 'Herstellung von Obturatoren fur den
weichen Gaumen'. Dtsch. Mschr. Zahnheilk.,1914,
32,775.
19. Williams, G.J. 'Obturators.' Brit.J. dent.Sci.,1864,
7, 531-3.
20. Crane, -. 'Vulcanite obturator lined with aluminium!
Dent. Cosmos, 1870, 12, 328.
21. Parkinson, G. 'On the adaptation of artificial
palates'. Lancet, 1867, i, 41. See also 'Adaptation
of artificial palates'. Dent.Cosmos. 1865-6,7,300-301.
22. Coles, J. O. Mechanical treatment of deformities of
the mouth. 2nd. ed. (London, 1870), p.54.
23. Bates, R.H. 'Cleft palates (surgical treatment and
artificial vela)'. Brit.J.dent.Sci.,1887,30,1119-1126.
24. Martinier,P. and Lemerle,G. Prothèse restaurice bucco

24. -faciale (Paris, 1915), p.76. The error referred to was copied by Segre, R. 'Die prothetische Behandlung der Gaumenspalten'. Mschr. Ohrenheilk, 1936, 70, see p. 869.
25. Newland-Pedley, F. 'On the treatment of congenital cleft palate'. Guy's Hosp.Rep., 1894, 3rd.ser., 36, 203-212.
26. Gaujot and Spillman (n.13), p.34.
27. Stearns, C.W. 'Observations on congenital fissure of the palate, with some remarks on articulation and impediments of speech'. Lancet, 1845,ii, 260-262.
28. Stearns, C.W. 'Palatine fissure; its remedy by artificial means considered'. Vulcanite, 1860, 1, 37-48.
29. Ruppe, L. and Ruppe, C. 'Prothèse velo-palatine'. Odontologie, 1927, 65, see p.78.
30. Rowse, A.L. The use of history (Pelican Books edition, London, 1971), 11-28.
31. Delair, L. 'Method nouvelle de prothèse restaurice vélo-palatine'. Odontologie, 1901, 26, 353-358.
32. Delair, L. 'Voile artificiel à clapet'. Odontologie, 1902, 28, 59-67.
33. Delair, L. 'Sur la prothèse vélo-palatine'. Odontologie, 1905, 33, 143-154.
34. Ruppe and Ruppe (n.29), 83-86.
35. Case, C. See section 6.4.1.4.
36. Payne, J.L. 'An artificial velum for congenital cleft palate'. Proc. roy.Soc.Med., (Section of

36. Odontology) 1920-21, 14, 36-39.
37. Mitchell, V.E. 'Artificial restoration of lost of missing tissues in congenital cleft palate and other deformities of the mouth'. Dent. Cosmos, 1917, 59, 185-192.
38. Heath, C. 'The treatment of cleft palate (surgical and mechanical)'. Brit.J. dent.Sci.,1882, 25, 1131-1135, 1176-1182.
39. Bennett, L.W. 'The mechanical treatment of cleft palate'. Brit.J. dent. Sci.,1898, 41, 8-12.

6.3 ARTIFICIAL VELUM

6.3.1 Introduction

The concept of the artificial velum was explained in the introduction to this division of the study (section 6.1).

This form of soft palate prosthesis was devised by C. W. Stearns, later to be adopted and developed by N. W. Kingsley. These two personalities were studied in some detail as the balance of their contributions could not be accurately established otherwise.

6.3.2 CHARLES WOODWARD STEARNS (1817-1887)

6.3.2.1 Biography

By inference from his obituary notice, Stearns' birth year was 1818.¹ The Surgeon-General's Index² also gave this date.

In his own writings of 1845³, Stearns mentioned the provision of an artificial velum three years previously for a near relative, a gentleman aged about 26 years. As will be shown, this "near relative" was Stearns himself. His year of birth calculated from this information would have been 1816. However, it is conceivable that a young doctor, eager to make his mark, might have allowed some licence in estimating the passage of time to enhance his apparent experience.

This disparity in the two dates was resolved by the City Clerk of Springfield, Massachusetts, who provided a copy of Stearns' birth record, reproduced in figure 56. His birth date was September 24, 1817.

Charles Woodward Stearns' father was Charles Stearns,⁴ a man of local consequence in Springfield. Having graduated from Yale in 1837, the younger Stearns passed onto Harvard Medical School and took his doctorate of medicine at the University of Pennsylvania in 1840. Following a few months in practice in his native town, Stearns was a military surgeon during the years 1841-2¹.

There followed a sojourn in Europe, which lasted rather less than two years. In 1845 he was resident at 2 Vernon Place, Bloomsbury, London,³ but before returning to America, he visited Paris. His return home was

occasioned by "family matters" and a "shift of interests".⁵ These allusions may have been associated with the activities of his father, who in 1845/6 was involved in a land rights tussle.⁶

Stearns practice may even have lapsed for a time: in 1859 he was found by Dr.N.W.Kingsley working on brass faucets in a machine shop⁷. It is probable, however, that Stearns was employed in his own workshop on that occasion, indulging one of his practical interests, and that Kingsley placed an unfair complexion on the encounter.

At the time of the Civil War (1861-1865), Stearns was surgeon to the Third Regiment of New York Volunteers. He found time for scholarly pursuits during this service, as he published "Shakespeare's Medical Knowledge" in 1865⁸. A further study of Shakespeare's work appeared in 1869⁹. Dr. Stearns also produced a concordance to the constitution of the United States, which became a standard work. It has only been possible to trace the fourth edition of this work which appeared in 1873¹⁰. Apart from these publications, no information has been traced concerning Stearns' activities after the Civil War. He died in his native State, at Longmeadow, in September 1887.

6.3.2.2 Personal Experience of Cleft Palate

In his various writings, Stearns never admitted that he suffered from a congenital cleft of the soft palate. In the description of the development of his earlier vela, the author always referred to the work having been carried out for a "close relative".

Kingsley's first cleft palate patient was treated in collaboration with Stearns. This followed a chance introduction of the two through the aegis of the patient⁷. At their encounter, Kingsley equated the "close relative" of Stearns earlier writings with the author himself and subsequently described his medical colleague as having developed the artificial velum for his own mouth¹¹.

Supporting evidence came from Vidal¹²:

"There is actually in Paris (October 1845) an American doctor who has a separation of the soft palate. This doctor has designed and made an instrument which serves at the same time as an obturator and soft palate. The part which corresponds to the palate is of gold and is fixed to the corresponding molars ; a veil of gum elastic arises from the inferior border, a type of very yielding valve having a certain spring. When the instrument is in place, this doctor speaks absolutely as if the palate and soft palate were in perfect integrity; when on the contrary, the instrument is removed, his voice takes the special character of subjects which are devoid of a palate and his speech is unintelligible."

Stearns name was not mentioned, but the date corresponded to his visit to Paris.

Stearns wrote that his "close relative" submitted twice to the operation of staphylorrhaphy without attendant success: several dentists "were afterwards permitted, from time to time, to undertake the adaptation of artificial substitutes"¹³ These expedients also failed. Castle

later supplied further details⁴. The surgeon whose operations had failed was Dr. Warren of Boston. Castle's practice was requested to supply an artificial palate for the young Stearns, "a lad about 14 years of age", in 1831. The youthful patient watched Castle at work and produced an imitation of the appliance which was made for him. Castle subsequently gave Stearns the models of his mouth to work upon.

Castle's appliance was manifestly another of those which failed. His object in writing a diatribe of limited coherence 47 years after his professional encounter with Stearns was twofold. Firstly he felt it necessary to amend the account given by Kingsley of Stearns' development of the artificial velum;¹¹ secondly it had to be pointed out that, even if Castle's appliance had proved a failure, Stearns later gave up all interest in artificial vela, acknowledging the impossibility of achieving perfection.

Castle did not give details of the appliance he made for Stearns but the latter described two early failures¹³. One was of four thin gold plates hinged together in the fashion of plate armour (a type he later described as also having seen in London, made by Nasmyth⁵) and a gold plate bordered with gum elastic (unvulcanised caoutchouc).

Having qualified in medicine, Stearns apparently devoted much of his time to the development of an artificial velum. He achieved success with an intricate design made of soft vulcanised rubber; a material which had been devised by Charles Goodyear in 1839 and patented in

1844. The use of the artificial velum in his own mouth, coupled with rigorous speech training, was attended by considerable benefits. He was thus encouraged to visit Europe to promote his invention, but success with other patients was not readily achieved.

6.3.2.3 Stearns' Publications on Artificial Palates

During his visit to London in 1845, Stearns wrote four contributions to the Lancet on the subject of his "instrument for remedying imperfection of speech".

The first article³, above which Stearns initials were given incorrectly as C.H., covered the history of the author's experience with the successful instrument designed for his "near relative". A full description of the complicated appliance was given without the aid of engravings. Figure 57 was taken from a subsequent description of an appliance of the Stearns type as made by Drs. E.G. and J. Tucker of Boston. This description appeared in the 6th edition of Harris, "Principles and practice of dental surgery"¹⁴.

In essence the artificial soft palate consisted of a body and two wings, fabricated in soft vulcanite. The wings were so designed as to fold beneath the body when the palatal fissure was reduced in width by muscular activity. The elasticity of the material and nature of construction allowed the wings to expand when the fissure widened.

The velum was supported in position by two flat-coiled springs of gold, which were attached to a swaged gold palate, clasped to the teeth. The movement and configuration of the obturator were thus under the control of the

soft palate.

Amongst the discussion in Stearns second article¹³ appeared a classification of congenital palatal defects. Figure 58 was derived from his description of the various classes.

He suggested that the operation of staphylorrhaphy could succeed for Class III cases only. It was conceded however that Fergusson's innovation of severing muscle attachments, to reduce tension on the repair would improve chances of success.

The second article concluded with a discussion of the earlier and unsuccessful essays which the author had devised. This discussion continued into the third article¹⁵ where the author commented that the eventual evolution of a successful speaking aid resulted in an "accession of animal spirit" for his patient; this phenomenon was attributed to improved oxygenation of the blood. The article concluded with some thoughts on the individual's awareness of speech quality, which led, in the final article¹⁶, to an appreciation of elocution, especially as it affected the fissure palate subject. The author stressed the importance of speech training after the provision of a suitable appliance.¹⁷

Stearns did not appear in print again on the subject of his velar instrument until 1860. It was probable that his interest was re-kindled by Kingsley's invitation to participate in the treatment of a patient (1859)⁷. A comparison with his writings of 15 years before revealed

that the arrogance of the newly-qualified practitioner had been lost. The naïvety which suggested that a cleft palate might have been inherited from a grandfather, whose soft palate was damaged by a musket shot, had departed. The style was less pompous, the approach more critical. Stearns' disposition towards dental colleagues had also warmed; he invited them for instruction in his methods.

In the two articles for the *Vulcanite* ^{5,18} (1860), Stearns revealed that apart from the instrument for the "near relative", he had made two for other patients before embarking on his European trip. In London and Paris, he had treated a further five cases. Of these treatments two were successful and one an improvement over the patients existing appliance. This latter case had previously been under Nasmyth's care.

On reflection, Stearns had become aware of three faults in his original instruments :-

- i. The helical gold springs were too delicate.
- ii. The clasps were objectionable.
- iii. The artificial velum itself was insufficiently moulded to parts out of sight (i.e. on the naso-pharyngeal aspect of the velum).

By extending the wings of the artificial velum, the appliance was made largely self retentive with a path of insertion into the cleft, from behind, upwards and forwards. The helical springs were replaced by a direct swivel attachment between the base and artificial velum. Clasps were, however, retained less for vertical retention, more

to prevent antero-posterior movement (See figure 59).

Stearns also revised his classification into the groups illustrated in figure 60. The best results from the provision of artificial vela could be obtained in patients of Group I. This was also true for the surgery of the time.

Stearns believed that any impression procedure would distort the tissues at the margin of the defect. The pattern for the artificial velum was therefore carved as a wax model with the aid of repeated fittings into the cleft. In the London days, Stearns had advised the carving of a wooden mould from close-grained mahogany to fit the wax model. In this manner, the pattern was reproduced in vulcanised rubber. He had since witnessed Kingsley's method of preparing plaster and type metal moulds. These had obvious advantages and Stearns passed on the recommendation without, however, mentioning his collaboration with Kingsley.

The artificial vela, when processed in soft vulcanite as a tri-part valve, was attached by pivot to either a gold base (Class I defects) or a hard vulcanite base (Class II defects). Stearns stressed the need for vocal practice after the provision of the instrument and cautioned against newspaper reports of instant perfect speech when any prosthetic speech aid had been fitted. In the closing remarks, the reader was advised not to provide uneducated persons with these appliances. Whether this advice was generated by a desire to maintain the standing of his practice or whether he truly believed that an ill-educated

person would be unable to care for his appliance is impossible to discern. Perhaps the comment that this class had neither the time to attend nor the means to pay was the more cogent.

Stearns claimed complete originality for his design. Whether he was aware of the work of de la Barre¹⁹ and Snell²⁰ is unknown, as is the true role of Castle's instruction. Stearns attracted attention in the textbooks of Harris¹⁴ and Richardson²¹; he influenced Kingsley and also the concept of the artificial velum for the remainder of the century.

1. Stearns, C.W. Obituary. Tribune (New York)
14th September, 1887.
Reprinted Dent Cosmos, 1888, 30, 449.
2. Stearns, C.W. Surgeon-General's Index - Catalogue
(Washington, 1892), 1st. ser., 16 vols., XIII, 645.
3. Stearns, C.H. 'A new instrument designed to remedy
the imperfection of speech consequent upon congenital
fissure of the soft palate'. Lancet, 1845, ii, 7-8.
(The Lancet made an error concerning the second
initial). Reprinted Amer.J.dent.Sci., 1847, 1st. ser.,
7, 234-238.
4. Castle, A.C. 'The errors of scientific literature -
relating to artificial vela'. Johnstons dent. Misc.
1878, 5, 281-287.
5. Stearns, C.W. 'Palatine fissure; its remedy by
artificial means considered'. Vulcanite, 1860, 1, 37-48.
6. Report of the case of C. Stearns against J.W. Ripley
in the circuit court of the U.S. at Boston, Mass.
November term 1850 for malicious prosecution
(Springfield, 1851).
7. Thorpe, B.L. in Kock C.R.E. History of dental
surgery (Ft. Wayne, Indiana, 1910), 3 vols., III, 546.
8. Stearns, C.W. Shakespeare's medical knowledge (New
York, 1865).
9. Stearns, C.W. The Shakespeare treasury of wisdom
and knowledge (New York, 1869).
10. Stearns, C.W. A concordance to the constitution of
the U.S. 4th. ed. (New York, 1873).

11. Kingsley, N.W. 'History of artificial vela'.
Johnstons dent. Misc., 1878, 5, 1-7.
12. Vidal (de Cassis), A. Pathologie externe (Paris,
1846), 5 vols., IV, 21.
13. Stearns, C.W. 'Observations on congenital fissure of
the palate, with some remarks on articulation and
impediments of speech'. Lancet, 1845, ii, 260-262.
14. Harris, C.A. The principles and practice of dental
surgery. 3rd.ed. (Philadelphia, 1848), p.733.
4th.ed. (Philadelphia, 1850), 781-783.
6th.ed. (Philadelphia, 1855), 809-810.
7th.ed. (Philadelphia, 1858), 860-872.
8th.ed. (Philadelphia, 1863), 836-839.
9th.ed. (Philadelphia, 1866), 836-839.
10th.ed. (Philadelphia, 1871), 771-780.
11th.ed. (Philadelphia, 1885), p.980.
12th.ed. (Philadelphia, 1890), p.1207.
15. Stearns, C.W. 'Observations on congenital fissure of
the palate, with some remarks on articulation and
impediments of the speech' - cont. Lancet, 1845, ii,
284-287.
16. Stearns, C.W. 'Observations on congenital fissure of
the palate, with some remarks on articulation and
impediments of the speech' - cont. Lancet, 1845, ii,
310-312.
17. Reprinted Amer.J. dent.Sci., 1847, 1st ser., 7, 238-
259, 377-387.
18. Stearns, C.W. 'Palatine fissure, its remedy by

18. artificial means considered'. Vulcanite, 1860, 1, 73-83.

This article and that constituting n.5 were combined and published as a pamphlet, with the same title, 23 pp. 8°, New York, 1860.

19. See section 6.2.1.

20. See section 6.2.2.

21. Richardson, J. A practical treatise on mechanical dentistry 1st. ed. (London, 1860), 391-422.

Large sections derived from Stearns' Vulcanite articles or pamphlet are quoted (n.5 and n.18). The edition was published in the same year as these articles appeared and the rapid inclusion of the matter in the textbook was facilitated by the fact that palatal prosthesis was the last item dealt with and a late addition to the text could be readily effected.

2nd. ed. (London, 1869), 430-431. Reference to Stearns' obturator was severely cut and followed the presentation also found in Harris. (n.14).

3rd. ed. (London, 1880), 432-433.

4th. ed. (London, 1887), 696-698.

5th. ed. (London, 1888), 698-699.

6th. ed. was not available for consultation, but by

7th. ed. (London, 1897), all reference to Stearns' appliance had been dropped.

6.3.3 NORMAN W. KINGSLEY (1829-1913)

6.3.3.1 Biography

Kingsley was a considerable force in American dentistry during the second half of the last century. There can be no doubts concerning his drive, ability and contribution to the profession. However, as so often happens with men of stature, his personality was not well served by historical perspective.

In contrast to Stearns, biographical detail concerning Kingsley abounded in the literature - "The story of his long and useful professional and artistic career" was related by himself in 1907¹. The same details had been mentioned by Ottolengui² and the pattern reappeared in Thorpe's contribution to Koch's "History of dental surgery"³. The autobiographical notes formed the bases of subsequent obituaries⁴⁻⁸ and it speaks for the man that he felt that the provision of such notes was a duty which accompanied the greatness which had been thrust upon him¹.

Kingsley was born on October 26th 1829, in St. Lawrence County, N.Y. and claimed a direct line of descent from a Saxon, Ranulph, keeper of the kings lea. In 1848, after early clerical employment, he was taken on by an uncle, A.W. Kingsley, to be taught the arts of dentistry, with the exception of the preparation of block teeth. The younger Kingsley soon versed himself in this technique, however, by observing his uncle - in addition he was self taught in the filling of cavities, using extracted teeth.

After a short series of brief partnerships between

1850 and 1853, Kingsley set up by himself in New York city. He won a gold medal for his exhibit in the 1853 New York World Fair, this achievement was followed by a gold and a silver medal at the Paris Fair of 1855.

Kingsley's claim to have freely given his design for an artificial velum to the profession¹ is examined more closely below⁹, but his design won further medals for him in America. The tributes which Kingsley recollected having received from learned bodies in London and Paris, during his European trip of 1864/65, were embellished by time. Reference to contemporary accounts^{10,11} demonstrated that he was received with courtesy, but modified rapture, in both capitals.

Kingsley was the organiser and first Dean of the New York College of Dentistry (1866-1869), where he was also Professor of Dental Art and Mechanism. In 1868, Kingsley was a founder member of the New York State Dental Association: he received an honorary DDS (Baltimore) in 1871.

Although Kingsley's prosthetic achievement is stressed in this present context, he was also a pioneer orthodontist. These two aspects of his practice appeared in his 1880 text on oral deformities.¹²

Kingsley again visited Britain in 1881 as a contributor to the International Medical Conference.¹³

During his retirement, Kingsley devoted himself to the sculpturing and artistic interests which had been his leisure occupation throughout his life. He died at Warren Point, New Jersey on 20th February 1913.

6.3.3.2 Kingsley's First Cleft Palate Patient

One version of how Kingsley and Stearns met and co-operated in the treatment of Kingsley's first cleft palate patient has already been quoted.¹⁴ The story was also detailed by Kingsley in 1880¹⁵. The two accounts agreed substantially, but the date of the Stearns-Kingsley introduction was given more specifically as February 1860 in the latter account.

The defect with which the patient presented is depicted in figure 61. Kingsley made a search of the literature in an effort to bring himself abreast of current thought on the topic of artificial palates, but could only find an account of Stearns' appliance which was incomprehensible to him. A simple hard vulcanite appliance was thus made for the patient (Figure 62). A few days after this had been completed Stearns and Kingsley met. Stearns reluctantly agreed to manufacture an artificial velum of his own pattern, if Kingsley would provide the hard vulcanite base and replacement teeth. Their combined effort is depicted in figure 63.

Kingsley was not at all happy with Stearns' method of freehand carving the velar pattern and again carving a mahogany mould for the vulcanising process. Having seen the tri-part valve made by Stearns, and appreciated the principle, Kingsley rationalised the production procedure. He acquired a plaster of Paris impression of the defect, from which a cast was obtained. A gutta-percha model of the velum was prepared and duplicated in hard vulcanite. A plaster of Paris coffin was manufactured around the vulcanite

model and the sections of the coffin duplicated in type metal. The manufacture of a permanent mould, capable of withstanding the vulcanising process, enabled any number of soft vulcanite vela to be produced from the original pattern. This was essential, due to the limited life of soft vulcanite in the mouth. Figure 64 illustrates a mould as Kingsley presented it, whilst figures 65 and 66 illustrate plaster and type metal moulds in the possession of the British Dental Association Museum.

Kingsley remade the prosthesis for the patient by his new methods (figure 67). The only early modification which Kingsley made to the structure of the velum was to replace the gold springs, which kept the central flap from drooping, with unitary springs of soft vulcanite. (See figure 68).

6.3.3.3 The Establishment of Kingsley's Method

Kingsley, encouraged by his early success sought further advancement of his knowledge at the 1863 American Dental Convention in Saratoga. Dr. Atkinson spoke on the subject of "Cleft Palate", but it became apparent from the discussion which ensued that Kingsley knew more of the topic than the principal speaker. Kingsley was invited to take the platform and, in recognition of the advancement which his work represented, he was awarded a gold medal.¹⁷

Following the presentation of a paper to the Odontographic Society of Pennsylvania (6th October 1863) and the exhibition of treated patients (3rd May 1864), the Society also presented Kingsley with a gold medal.¹⁸

Kingsley claimed to have received a great number of

enquiries as to how his appliance might be fabricated as, later in 1864, he made this the excuse to publish a pamphlet.¹⁹ The pamphlet amounted to a symposium of the press approbation he had received, dwelt on the medals with which he had been presented, but gave little or no instruction on the production of the artificial velum. Kingsley later claimed that, after private viewings, he was exploited in the press - extravagant claims being made on his behalf.²⁰ In the light of his pamphlet, it would seem that Kingsley saw few disadvantages in this publicity at the time.

Kingsley departed for Europe on 29th October 1864.²¹ His arrival in England and address to the Odontological Society in London was heralded in the British Journal of Dental Science.²² At the meeting of the Society on 4th December 1864, the reception fell short of the adulation to which the speaker had become accustomed.¹⁰ Sercombe, who had advocated a very simple prosthetic velar flap,²³ and established surgeons such as Coleman and Mason criticised the complexity of Kingsley's device and its poor durability.

The discussion of Kingsley's paper overflowed from the meeting into the correspondence columns of the British Journal of Dental Science. One of the correspondents, G.J. Williams²⁴, included an engraving of a simple hinge flap velum he had published in 1862²⁵ and which Coles subsequently reproduced.²⁶ In reply to the correspondence, Kingsley commented:

"All things are complicated to those who do not know how to master them, and equally simple when they

obtain that knowledge".²⁷

Kingsley subsequently recorded that:

"The criticism of the complexity of my instrument (showed) that its production was above the reach of ordinary dentists".²⁸

This observation did scant justice to his London audience, as few of that number had been "ordinary dentists". He must have felt that the criticism was justified as he straightway returned to his hotel and devised a simplified velum, of which he made a paper model.

Whilst in London, Kingsley contributed two general articles on the subject of "Cleft Palate" to British Journals.^{29,30} An engraving of the artificial velum accompanied each publication, but there was insufficient detail for the method of construction to be gleaned.

Kingsley carried with him on this trip an introduction from Valentine Mott of New York to Baron Larrey of the Academy of Medicine in Paris. The baron was an established authority on the treatment of cleft palate.³¹ Larrey read a paper, dealing with Kingsley's appliance, to the Academy on 9th May 1865.¹¹ The Academy had a very strong tradition of researching the background to presented papers: Larrey recalled that six years previously he had been required to evaluate a communication by a M. Baizeau which had dealt with cleft palate.³² In the circumstances, Larrey regretted that Kingsley was unable to support his claims by presenting a treated patient to the gathering.

Thus Kingsley's European sojourn was not the triumphant progress he would later have his readers believe.

The meeting of minds with English and French confreres was probably a greater stimulus to his work than the admiration of his American colleagues, although Kingsley was not the man to admit of this. He returned home to improve upon the simplified velum conceived in London. The influence of London circles remained with him, as his article on obturators for the 1871 edition of "Harris" included mention of Sercombe's velum, albeit a critical mention.³³

6.3.3.4 The Improved Kingsley Velum

Kingsley described improvements to his artificial velum at the 1866 annual session of the American Dental Association in Boston,³⁴ and the 1868 meeting at Niagara Falls.³⁵ He maintained the physiological necessity of soft vulcanite. His argument was that the muscular activity of the soft palate remnants would be enhanced by the elastic vulcanite and hence atrophy would not occur.

The elaborate tri-partite valve inherited from Stearns was dispensed with. The velum was now of unitary construction with deep lateral grooves within which the margins of the soft palate remnants could contract in function. These simplifications were designed to "render success easy to any dentist of moderate skill".³⁴ A two part mould now sufficed to vulcanise the velum in place of the previous four part. Figure 69 illustrates the final pattern of artificial velum evolved by Kingsley.³⁶

6.3.3.5 Machinations on the American Scene 1864-1867

Kingsley had published his pamphlet in 1864 and straightway left for Europe. His trip kept him from the

1865 American Convention held in Chicago. At this meeting, adverse comment was made in a report concerned with innovators who did not publish adequate details of their innovations to benefit the profession at large. Kingsley regarded a portion of this report as prejudicial to his reputation and stated that it was written by a "personal enemy".³⁴ The enemy, it transpired, was Bogue,³⁷ the man whom Kingsley had proudly quoted in his 1864 pamphlet.

"I find nothing, however, in Europe which so completely answered these indications as an Artificial Velum constructed by Dr. N.W. Kingsley of New York".³⁸

Kingsley defended himself at the Boston meeting of 1866 against McKellops, who renewed the charges of insufficient published detail of Kingsley's methods. The argument centred around whether or not Dr. Dwinelle's description of the Kingsley velum in the 1863 edition of "Harris"³⁹ was adequate. Kingsley had certain knowledge of one practitioner who had manufactured a velum satisfactorily from the information given in the textbook: a Dr. Palmer later supplied a testimonial that he had been similarly aided.⁴⁰

The opposition was not satisfied. Cushing drew attention to Bogue's improvement on the Kingsley velum and called upon Bogue to publish a detailed account.⁴¹ The latter complied,⁴² albeit with an unillustrated contribution. He added the rider that in spite of a four hour speech in Boston, there was still no clear description of how to make a Kingsley velum. Bogue hoped that his description of a simplified velum would aid those patients

who sought relief but could not afford a \$500 fee. He also acknowledged his debt to the Frenchman, Preterre, for whom he had a great admiration, especially as regards the work undertaken for children.

"In this latter respect, M. Preterre has, in my opinion, done a greater service to the class suffering from congenital cleft palate, than any other one man, either European or American".

This represented a radical change of view since his laudatory comments concerning Kingsley three years previously.

6.3.3.6 Rottenstein's Modification

Having heard the presentation of Kingsley's paper in Paris (1865), J.B. Rottenstein wrote to the Odontological Society of Great Britain:

"The construction of artificial velums is a matter for open discussion, for Mr. Kingsley is not the inventor, but only a modifier, like many others, of Mr. Stearns' instrument".⁴³

The publication of this letter was followed by the appearance of a translation of Rottenstein's presentation to the German Medical Society of Paris on the subject of cleft palate.⁴⁴ From a study of the research by Passavant and others, Rottenstein was of the opinion that complete velo-pharyngeal seal was not essential for the amelioration of the characteristics of cleft palate speech. The prosthetic repair which was advocated is illustrated in figure 70.

- A. Hard vulcanite base.
- B. Velar portion in soft rubber, arched nasally.
- D. Rim of the velar portion applied to the borders of the defect.
- c.f. Split in velum to aid approximation of fissure margins.

Rottenstein also detailed his plaster impression technique in such cases.

6.3.3.7. Kingsley's Publications

Kingsley was a prolific writer. The Cumulative Index of Dental Literature gave considerable reference to his papers, those concerning obturators were abstracted by the New York Academy of Medicine bibliography.

The burden of Kingsley's papers before 1880 was collected into his work, "A treatise on oral deformity as a branch of mechanical dentistry".¹² His work on artificial vela first appeared in the standard texts in the eighth edition of Harris' textbook (1863).³⁹ Kingsley himself wrote the section on obturators for the tenth (1871) edition of this work.³³ It was in this section that Kingsley summarised his philosophy of the artificial velum in relation to oral physiology.

"The Stearns instrument, with all its complexity embodied the only true principle viz. the rendering available of the muscles of the natural palate to control the movement of the artificial palate".⁴⁵

The contribution remained largely unchanged through the subsequent three editions and formed the basis of related sections in the textbooks of Hunter and Richardson.

1. Kingsley, N.W. 'The story of his long and useful professional, and artistic career told by himself'. Foreword by Thorpe, B.L., Dent. Brief, 1907, 12, 41-49, 106-113, 192-197, 245-251, 319-326, 383-390.
2. Ottolengui, R. 'Biographical sketch of Normal William Kingsley'. Amer. dent. J., 1905, 4, 530-535.
3. Thorpe, B.L. in Koch, C.R.E. ed. History of dental surgery (Fort Wayne, Indiana, 1910), 3 vols., III, 542-559.
4. Kingsley, N.W. Obituary. Amer. dent. J., 1912-1913. 10, 415-416.
5. Kingsley, N.W. Obituary. Dent. Brief, 1913, 18, 575-575.
6. Kingsley, N.W. Obituary. Dent. Cosmos, 1913, 55, 458.
7. Kingsley, N.W. Obituary. Dent. Digest, 1913, 19, 485.
8. Kingsley, N.W. Obituary. Items, 1914, 36, 312.
9. See section 6.3.3.5.
10. Proceedings of the Odontological Society of Great Britain, 5th December, 1864, Brit. J. dent. sci., 1864, 7, 548-576.
11. Séances de 9 mai 1865. Bull. Acad. Méd. Paris, 1864-5, 30, 707.
12. Kingsley, N.W. A treatise on oral deformities as a branch of mechanical surgery (New York and London, 1880).
13. Kingsley, N.W. 'Civilisation in its relation to the decay of the teeth'. Transactions of the International Medical Congress, 7th session, Diseases of the Teeth (London, 1881), 97-103. The leatherbound and tooled copy of these transactions, presented to Sir Charles

Tomes, is in the possession of the British Dental Association library.

14. See section 6.3.2.2.
15. Kingsley (n.12), p.271.
16. Ibid., p.299.
17. Ibid., p.275.
18. Proceedings of the Odontographic Society of Pennsylvania, 3rd May, 1864, Dent. Cosmos, 1864, 5, 621-622.
19. Kingsley, N.W. Treatment of congenital cleft palate. (New York, 1864).
20. Thorpe (n.3), p.547
21. Notice, Dent. Cosmos, 1864, 6, 216-217.
22. Miscellanea, Brit. J. dent. Sci., 1864, 7, 524.
23. Sercombe, E. 'Cleft palate: its surgical and mechanical treatment'. Trans. odont. Soc., 1856-57, 1st ser., 1, 75-100.
24. Williams, G.J. Letter, Brit. J. dent. Sci., 1864, 7, 531-533.
25. Williams, G.J. "Case of fissure of the whole of the hard and soft palates (Mechanical treatment)." Dent. Rev. 1862, 1st. ser., 4, 104-105.
26. Coles, J.O. On deformities of the mouth, congenital and acquired, with their mechanical treatment, 2nd. ed. (London, 1870), 51-52.
27. Kingsley, N.W. Letter, Brit. J. dent. Sci., 1864, 7, 534.
28. Kingsley (n.12), p.275.
29. Kingsley, N.W. 'On the treatment of congenital cleft palate'. Lancet, 1864, ii, 685-688.

30. Kingsley, N.W. 'Treatment of congenital cleft palate'.
Med. Times Gaz., 1864, 2, 644-647.
31. Larrey, H. Sur les perforations et les divisions de la
voute palatine (Paris, 1850). According to Grunert O.
in Scheff. J. Handbuch der Zahnheilkunde (Vienna, 1904),
3 vols, III, 424.
32. Larrey, H. 'Sur la perforation et les divisions de la
voute palatine.' Union med., 1859, 1st. ser., 1, 197-201,
228-234.
33. Kingsley, N.W. in Harris, C.A. The principles and
practice of dental surgery, 10th ed. (Philadelphia,
1871), 769-770.
34. Kingsley, N.W. in Transactions of the American Dental
Association, Dent. Cosmos, 1867, 8, 128-130, 131-136.
35. Kingsley, N.W. in Transactions of the American Dental
Association, Dent. Cosmos, 1869, 10, 462-463.
36. Kingsley (n.12), p.280.
37. Kingsley (n.34), p.136.
38. Bogue, E.A. Letter. Peoples dent. J., July 1864,
reprinted in n.19.
39. Dwinelle, W.H. in Harris, C.A. The principles and
practice of dental surgery. 8th ed. (Philadelphia,
1863), 843-853.
40. Palmer, S.B. 'Dr. Norman W. Kingsley's artificial
palate'. Dent. Cosmos, 1866, 7, 300-301.
41. Cushing, G.H. 'Dr. E.A. Bogue's improvements upon
the Kingsley artificial palate'. Dent. Cosmos, 1866,
7, 525-7. Reprinted Brit. J. dent. Sci., 1866, 9,
320-322.

42. Bogue, E.A. 'How to construct an artificial palate'.
Dent. Cosmos, 1867, 8, 3-9. Reprinted Brit. J. dent.
Sci., 1867. 10, 491-499.
43. Rottenstein, J.B. Letter. Brit. J. dent. Sci., 1865,
8, 111-115.
44. Rottenstein, J.B. 'On the treatment of congenital
cleft palate, with a view to attaining normal
articulation. A paper read before the German Medical
Society of Paris by J.B. Rottenstein, and translated
from French by C.J. Fox'. Brit. J. dent. Sci., 1865,
8, 353-355, 401-405, 453-456, 549-552.
45. Kingsley (n.33), p.771.

6.3.4 OTHER ARTIFICIAL VELA

6.3.4.1 A Preterre

As pointed out in section 6.2.3, Preterre described both complicated flap vela and artificial vela.

The degree of influence which Kingsley and Preterre exerted upon each other in the matter of artificial velum design is uncertain. There are points of similarity which are inescapable. For example, both workers employed soft vulcanite and incorporated integral springs of the same material to assist movement of the prosthesis. This was an early feature of Kingsley's design which was soon abandoned.¹ (Cf. figures 71 and 68). Gaujot and Spillman recognised the similarity, but did not wish to make a judgement on the priority issue².

Certainly Preterre presented an artificial velum to the Surgical Society of Paris³ six months before Larrey presented Kingsley's design to the Academy of Medicine in the same city.⁴ (Preterre's presentation, 3.11.1864; Kingsley's, 9.5.1865).

Kingsley stated that his integral spring design was prepared for a patient in 1863⁵. As previously demonstrated, this date coincided with Kingsley's "secretive" period, during which he was content to give the broad indications of his developing methods whilst sparing details of construction⁶. It was thus improbable that Preterre, in another continent, had sufficient advanced information to be influenced by Kingsley's development of integral springs. It is more probable that Preterre was guided towards the production of an artificial velum by Stearns' second phase

of publication in 1860⁷. The methods by which Stearns and Preterre embraced the velar remnants are mutually reminiscent. (Cf. figures 59 and 71). Preterre had sufficient experience of metallic helical springs by 1860 to appreciate their limitations and the value of integral springs may well have occurred to him independently.

It should be noted that Preterre and Kingsley were not using their respective integral springs for identical purposes. Kingsley's springs governed the relative movement of the split components of the velum. Preterre's velum had already moved away from Stearns' original concept by eliminating the split design. In this respect Preterre was ahead of Kingsley. Preterre's spring was positioned to improve the antero-posterior flexibility of the artificial velum as it moved under the influence of the residual palatal musculature⁸.

Kingsley claimed that he had devised his simplified velum in his hotel in London⁹. This would have been prior to his visit to Paris. Comparing figures 69 and 72, one cannot resist the speculation that Kingsley might be deliberately disguising Preterre's influence on the modification of his own views which took place during the European trip.

6.3.4.2 James Oakley Coles

Coles was more convinced than most of his English colleagues by the concepts which Kingsley presented during his visit to London in 1864. This was demonstrated in the remarks which Coles published on the introduction of Suersen's bulb obturator in 1867¹⁰.

Coles produced a volume on the mechanical treatment of oral deformity, in association with Ramsay, in 1868¹¹. Ramsay had previously published his recommendations for the simplification of Kingsley's palatal prosthesis¹², but the partnership was short lived as the second edition of the work appeared under the sole authorship of Coles¹³.

Comparison of figures 73 and 74 demonstrates the close similarity of Coles' artificial velum with Kingsley's own, later modification. Figure 74 illustrates the method Coles adopted to fix the velar portion of soft vulcanite to the hard vulcanite denture base by means of a gold pivot pin¹⁴.

In the third edition of his text on cleft palate¹⁵, Coles shifted the emphasis from the mechanical aspects of treatment to discussion of the embryology of the condition and the results of his cephalometric investigations.

6.3.4.3 Claude Martin

Figure 75 illustrates Martin's winged velum as depicted by L. and C. Ruppe¹⁶. The prosthesis consisted of three components, all fashioned from soft vulcanite. The central bulb was fixed but the lateral members could be moved medially by the soft palate remnants to produce a nasopharyngeal seal. The wings attached to the base of the appliance extended anteriorly in the vestibular space, gripping the buccal aspect of the alveolus to assist in retaining the device.

6.3.4.4 Alfred Kolliker

Kolliker devised an artificial velum which was an improvement on a system originally described by Peyer¹⁷.

The appliance was so intricate that K  lliker found it impossible to describe its preparation in detail. His account was illustrated by a number of engravings, one of which is reproduced in figure 76.

"The plate closing the defect consists of hard vulcanised rubber, it is divided into three sections which can be shifted and adjusted and are held in constant contact with the walls of the pharynx and the soft palate rudiments by means of light-weight springs without interfering with the function of these parts, let alone injuring them."

The caption for the engraving in figure 76 read:
"Obturator seen from the top. The movable sleeve which pushes the entire body of the moving plug rearward and the small springs which force the side parts outward together with the pivots can clearly be seen."

In essence, it would appear that K  lliker's velum functioned in a similar manner to Martin's¹⁸, with the added sophistication of a central bulb which moved antero-posteriorly.

Asked later why K  lliker's ingenious appliance had not established itself, Stoppany gave the opinion that it was too difficult to produce for the results it gave¹⁹. Stoppany also suggested that the pressure caused by the springs lead to muscle atrophy, whereas the muscular exercise engendered by the bulb of the Suersen pattern led to a decrease in the size of the natural defect²⁰.

1. Kingsley, N.W. A treatise on oral deformities as a branch of mechanical surgery (New York and London, 1880), p.275.
2. Gaujot, G. and Spillman, E. Arsenal de la chirurgie contemporaine.....(Paris, 1872), 2 vols., II, 38.
3. Preterre, A. Reports of this presentation appeared in Gaz. Hôp. (Paris), 1865, 38, 11-12: and Bull. Soc. Chirurgie Paris, 1866, 2nd ser., 6, 176.
4. Larrey, H. Report on Kingsley's artificial velum. Bull. Acad. Méd. Paris, 1864-1865, 30, 707.
5. Kingsley (n.1), p.274.
6. See sections 6.3.3.4 and 6.3.3.5.
7. Stearns, C.W. 'Palatine fissure; its remedy by artificial means considered. Vulcanite, 1860, 1, 37-48.
8. Gaujot and Spillman (n.2), II, 39.
9. See section 6.3.3.3.
10. Coles, J.O. 'Remarks on a lecture by Dr. Wilhelm Suersen'. Brit. J. dent. Sci., 1867, 10, 446-449.
11. Ramsay, R. and Coles, J.O. The mechanical treatment of deformities of the mouth. (London, 1868).
12. Ramsay, R. 'The treatment of congenital cleft palate'. Brit. J. dent. Sci., 1865, 8, 85-86, 88-89, 231-233. Dent. Rev. 1865. 2nd ser., 2, 273-276. Trans. odont. Soc., 1863-65, 1st ser., 4, 274-293.
13. Coles, J.O. Deformities of the mouth, congenital and acquired with their mechanical treatment, 2nd. ed. (London, 1870).

14. Coles (n.13), p.94.
15. Coles,J.O. Deformities of the Mouth, congenital and acquired with their mechanical treatment, 3rd.ed. (London,1881).
16. Ruppe,L. and Ruppe,C. 'La balle obturatrice'. Odontologie, 1927, 65, 277-302. See p.283.
17. Kolliker,P.A. 'Gaumenobturator'. Schweiz. Vjschr. Zahnheilk., 1894,4, 5-7.
18. See section 6.3.4.3.
19. Stoppany,G.A. Report of a paper. Schweiz. Vjschr. Zahnheilk., 1908, 18, 156-157.
20. Stoppany,G.A. 'Cleft palates and obturators'. Dent.Rev., 1909, 23, 1035-1039.

6.4 BULB OBTURATORS

In writing of bulb obturators, it is necessary to distinguish between those which were designed from a physiological premise and those in which the design was largely fanciful.

6.4.1 Physiological Bulb Obturators

It was demonstrated in section 6.3 that Kingsley and the adherents of the artificial velum sought to place their prostheses under the muscular influence of the soft palate remnants. By this means (and principally through the agency of the levator palati muscles) the artificial velum was lifted to the isthmus of the nasopharynx to provide a seal as required during speech and swallowing.

The bulb obturator laid an alternative emphasis on the mechanism of velopharyngeal seal. The bulb was fixed and rigid, lying between the palatal remnants. The lateral walls of the bulb were of sufficient height to be contacted by the palatal remnants at any degree of elevation: the posterior wall of the bulb was formed in such a manner that, on contraction, the superior constrictor muscle of the pharynx contacted the bulb to achieve a seal.

6.4.1.1 Gion's Velar Obturator

L. & C. Ruppe lamented that, although Gion had described a bulb obturator for a congenital hard and soft palate defect in 1865, it was the German, Suersen, who received all the credit for conceiving it¹. Suersen's description was given in 1867 and is detailed in section 6.4.1.2.

Several contributory factors may be advanced for Gion's failure to register his idea with the success that attended Suersen.

Gion was a Frenchman. The French exponent of oral prosthesis, who was in the ascendancy during the period including 1865, was Preterre². His designs were masterfully intricate and he had been demonstrating them internationally at exhibitions and meetings of influential bodies for a number of years. Against this reputation, Gion's presentation of one case to the Société de Chirurgie in Paris (subsequently reported in the Gazette des Hôpitaux)³ was grossly insufficient to convince the fraternity that there was merit in his concept. Gaujot and Spillman,⁴ in reviewing Gion's prosthesis seven years later, still felt it had limited potential as it did not possess the mobility of the natural soft palate.

Suersen, in contrast, did not have to pit his ideas against an established German master. He chose a national meeting, internationally reported, at which to present three successfully treated patients. Moreover, he also introduced his topic in a manner which suggested that he had investigated the physiology of naso-pharyngeal closure.

Gion's appliance is illustrated in figure 77. The base of the prosthesis was of platinum and was clasped to the molar teeth. Additional retention was obtained from a peg inserted into the root canal of an incisor tooth. The base-plate was surmounted by a mass of hard vulcanite which was prolonged posteriorly, almost to the posterior wall of the pharynx. The space which was left was sufficient for

the drainage of mucous and disappeared during swallowing, due to the activity of the pharyngeal musculature. The two holes in the appliance, protected by valves, permitted inspiration and expiration.

6.4.1.2 Wilhelm Suersen

Suersen described a bulb obturator, according to the precepts detailed under the heading 6.4.1, at a meeting of the Central Association of German Dentists (C.A.G.D.) in Hamburg (1867)⁵. The method of construction involved moulding gutta percha to the required form within the patients nasopharynx. This model was then reproduced in hard vulcanite with a core of cotton wool to reduce weight.

Suersen's dissertation and demonstration of three patients treated by the method won enthusiastic plaudits and (as Kingsley had achieved) a gold medal.

Suersen compared his appliance favourably with that of Kingsley. Being made as a hollow bulb of hard vulcanite, it was more simple, robust and durable than Kingsley's artificial velum. Moreover, Kingsley's appliance was not suited for use in cases of acquired defect.

Kingsley later commented that whilst Suersen's was probably the best form of obturator it was only applicable after the patient had learned improved speech with an artificial velum⁶. Soft rubber was better adapted than hard to the acquisition of articulation and the rôle of the levator palati muscles more important than that of the superior constrictor. Kingsley did in fact employ hard rubber bulbs, but only after training his patients on artificial vela. Ottolengui confirmed the success of

this régime⁷.

Suersen's dissertation received early publicity in the American and British Journals of Dental Science^{8,5}. Oakley Coles⁹ published critical remarks, based on the abridged report which had appeared in the British journal. He could not agree with Suersen's emphasis on the rôle of the superior constrictor muscle and pointed out that any form of cover to an acquired palatal defect produced instant improvement in articulation. (Two of Suersen's demonstration patients had acquired defects). Coles recalled Kingsley's achievement with a greater warmth than had been generally accorded during the latter's visit to London in 1864. The faults in Kingsley's velum had been done away with by Coles' associate, Ramsay, who had maintained the important feature of an elastic velum by the use of soft vulcanite¹⁰. (Figure 78).

Suersen presented a further paper to the subsequent meeting of the C.A.G.D.¹¹, covering very much the same ground, but stressing the need for the obturator to extend to the cartilaginous tubes of the inner ear for phonetic purposes. The impressions of these tubes are evident in the postero-superior corners of the bulb in figure 79.

Whilst Weber¹², Gibson¹³ and Bishop^{14,15} wrote in favour of the Suersen system in America, this type of appliance prospered in Germany to a greater extent than elsewhere, probably due to chauvinistic influences. Weber gave step by step instructions for making a Suersen obturator. Gibson agreed with a patient who had written

to him asking why hard rubber was not more extensively used for obturator bulbs. Bishop's information was more indirectly derived. He presented a potted history of palate prostheses derived from Ramsay and Coles¹⁶ (the origins of this account lay with Snell). His description of a hard rubber obturator of the Suersen type was taken from Gunning's work. Bishop advised early use of the bulb to avoid the establishment of bad speech habits: apparently in direct conflict with this view, Bishop also stated that appliances should not be fitted before the age of 15 years.

Suersen contributed the section dealing with palatal defects in Baume's textbook¹⁷. He based this contribution on his views of speech physiology and the advisability of the bulb form of prosthesis. In this respect he also drew on the support of Sauerbier¹⁸.

Although there were those who believed that the posterior pharyngeal wall might bulge forward under the influence of muscles other than superior constrictor (Debout¹⁹ proposed the stylopharyngeus and mid portion of palato-pharyngeus), the importance of the posterior pharyngeal wall in the production of an oro-nasal seal became increasingly recognised under the influence of writers such as Passavant²⁰ and Warnekros²¹. Thus, by the end of the century when the true concept of the artificial velum was waning, Suersen's concept was still waxing. Grunert²² (in Scheff's Handbook of 1904) gave the method of construction of a Suersen obturator in considerable detail. The principle was also used in obturators which were

provided in combination with surgery. Suersen's concept has, in fact, endured to the present day, as illustrated in figure 80.

6.4.1.3 Modification of Suersen's Design

Suersen's original appliances were bulky; this was inescapable if the tubular eminences were to be covered. Others questioned the need for this extension. According to Stoppany²³, Billeter of Zurich advised the reduction in size of the appliance well before Warnekros publicised his own view. Figure 81 demonstrates the extent to which Warnekros recommended the reduction in size of the bulb: figure 95 illustrates the location of the appliance.

Warnekros²⁴ defended himself against suggestions that his obturators closely resembled those of Stoppany by claiming that the concepts were entirely different. Although this assertion was supported by a bevy of references it was hard to assimilate, for Stoppany described his own modified Suersen design as about $\frac{1}{2}$ cm. thick and touching upon the side walls of the cleft, palato-pharyngeus and superior constrictor muscles²³. The difference, it transpired, was ideological. Warnekros lay total emphasis on the rôle of the superior constrictor muscle in achieving oro-nasal seal in conjunction with the obturator, whereas Stoppany supported Röse's view that the palato-pharyngeus took this function²⁵.

Paradoxically, whilst Warnekros sought to detract from Stoppany, Stoppany acknowledged the rôle played by Warnekros. Following a presentation of his appliances, Stoppany received an enquiry as to the method of preparation. He

answered by stating that they were made by the Suersen method as modified by Warnekros²⁶.

Both Stoppany and Warnekros published and were reported extensively in the Swiss and German literature respectively. Their views were scantily represented in the English language, only one major article by each being published^{23,24}. Gunning, however, wrote of the reduced Suersen bulb in the American literature²⁷.

One of the criticisms which Coles⁹ made on first learning of Suersen's development was that no account had been taken of the accumulation of mucous which the bulb would engender. Others, more sympathetic to Suersen's concept, devised means of overcoming this practical problem. Hartung and Rudolstadt (according to Grunert²⁸) made a cup shape depression in the superior surface of the bulb to assist drainage of the mucous and lighten the appliance. (see figure 82).

Grunert²⁹ also claimed that Bruck (1870) was the first to conceive the idea of placing a hole through a Suersen bulb to give a free nasal airway at rest. Bruck illustrated this appliance and presented a resume of the forms of soft palate prosthesis in current use³⁰.

Baker contributed a number of papers on prosthetic therapy for cleft palate^{31,32}. He also wrote the chapter on this subject in Litch's textbook³³.

Baker bastardised Suersen's concept rather than modified it. He would quote Kingsley's view and also Suersen's to demonstrate that his own device represented an amalgam of the better features of both designs. Baker

found soft rubber objectionable and devised a chestnut shaped bulb of hard vulcanite or gold. The bulb was hinged to a base plate so that it could be lifted by the levator palati muscles: when nasopharyngeal seal was not required, the hinge allowed the bulb to fall slightly. (See figure 83). The apparatus described by Hahn³⁴ was almost identical.

Brügger³⁵ devised a similar mechanism (figure 84). The velar portion of the bulb was hinged on the oral surface with an encased spring on the superior aspect. Brügger reduced the weight of his bulbs by fashioning them of cork, which was impregnated with vulcanite.

To ensure nasopharyngeal seal when required, there were those who combined a fixed bulb with a valve-flap on the soft palate region. Grunert described Jüterbock's modification in which a thin Cofferdam was sewn beneath the bulb for this purpose³⁶. (See figure 85). In recent times, Watt recommended a similar procedure: on this occasion the flap was made from polythene sheet³⁷.

6.4.1.4 Calvin Case

Case's practice, in common with that of Kingsley's was orientated towards oral deformity. This is a speciality which no longer exists as such but involved orthodontics and prosthetics.

Case agreed with Kingsley's view on the role of palatal musculature vis-à-vis the artificial velum; his spirited discussion of Ames' statement that the palatal muscles were of little use in conjunction with an artificial appliance illustrated this point³⁸. Case's

early papers dealt with a method of producing Kingsley's velum^{39,40}, but his name came to be associated with a specific type of rigid obturator which gained support from the nasal floor. His publications on this design culminated in the second edition of his book published in 1921⁴¹.

Case laid emphasis on obtaining an accurate plaster impression of the defect of the hard palate and nasal floor. A trial obturator was then produced in tough modelling compound; the obturator was self retaining, embracing the margins of the hard palate defect. A copper wire loop was attached to the posterior aspect of the trial obturator and orientated so that it contacted the posterior pharyngeal wall above the zone of greatest contractibility, (i.e. at the level of the axis vertebra). Composition was moulded around the wire and was muscle trimmed in situ: the final, rigid prosthesis was derived from this trial model built up in the mouth.

From figure 86, which demonstrates the trial model placed upon a cast, it can be seen that the velar prosthesis was placed superiorly to the soft palate remnants and did not embrace them. Thus, although Case may have initially sympathised with Kingsley's views on the importance of levator palati muscles, his views crystallised in greater sympathy with those of Suersen.

6.4.2 Fanciful Bulb Obturators

The term 'fanciful' may be open to the criticism for a lack of objectivity. Was the margin of credibility so wide between Suersen's concept and other obturators of

supposedly similar function? If the difference between what are described as "physiological" and "fanciful" designs is related back to the original authors' approach to the problem, anomalies in the categorisation remain. Suersen may be credited with an interpretation of velopharyngeal muscle function for which he designed his appliance. Gion's approach was empirical - fanciful - yet he stumbled on an appliance which would be viewed as physiologically acceptable in modern eyes.

The test of time thus plays an important rôle in dividing the physiological from the fanciful. The former tended to be of simple design and, with the proviso that their use was attended by speech training, were seen to be effective. Fanciful designs bore intricate embellishments which did not provide significant advantages and did not withstand the passage of years. By this criterion, those modifications to Suersen's design already described (section 6.4.1.3) would qualify as fanciful.

L. & C. Ruppe (1927), who had also devised an embellished velar flap appliance⁴², collaborated to produce a more sophisticated bulb obturator⁴³. The Ruppes felt that there was a need for both forms of prosthesis. The bulb was of value when the soft palate remnants were atrophied and the pharyngeal musculature was well developed. The bulb was also of value when the cavum (i.e. the cranial aspect of the nasopharynx) was enlarged and especially resonant.

Of these criteria, the first two might be deduced readily from an understanding of the Kingsley and Suersen

concepts. The third criterion correlated well with the relationship, which Riegner⁴⁴ had demonstrated in 1914, between various forms of soft palate prosthesis and the nasopharynx. Riegner had taken a series of lateral skull radiographs using iodoform as a contrast medium. The Ruppes, however, made no reference to any work which supported their contention that it was desirable to reduce the resonance of the cavum by means of a prosthetic appliance.

The Ruppe's appliance is illustrated in figure 87. It was made of hard vulcanite and the tubes were inserted to facilitate breathing. The bulb was mounted on a ball and socket universal joint which itself bore upon a spring loaded slide. The contrivance was thus free to move in all planes and follow the displacement of the posterior pharyngeal wall. The Ruppes felt this to be a requisite of a successful bulb obturator and had designed it as an alternative to other improvements to the basic bulb form.

Brandt had attempted one of these improvements. He felt that the hard bulbs interfered with, rather than complimented, muscle action; that they created breathing difficulties, inflammation and catarrh. He proposed to overcome these drawbacks by the use of inflatable balloon obturators (figure 88). Morton Smale⁴⁵ presented the designs to the British Dental Association and the Odontological Society of Great Britain on Brandt's behalf. Probably due to the novelty of the design, it attracted some attention⁴⁶ but there is no evidence that it was a clinical success or was widely used.

Martin produced a further fanciful design on which the

Ruppel⁴⁷ and Segre⁴⁸ commented. In figure 89 'A' and 'B' represent two inter-communicating pockets, incompletely sufflated with water. The notion was that the palatal remnants would exert a pressure on the lower pocket, transferring water to the upper pocket and augment pressure against the pharyngeal wall. When the contraction ceased, the liquid would descend into the lower pocket to close off the nasal fossae. Martin apparently abandoned the appliance due to production difficulties. According to the Ruppel⁴⁹, Martin had devised his prosthesis from an idea put forward by Gaillard in 1878. This reference could not be traced.

Figure 90 illustrates a less intricate bulb obturator devised by Martin. The bulb, although of similar form to that of Suersen, was of soft vulcanite and was hinged to facilitate insertion.

1. Ruppe, L. and Ruppe, C. 'La balle obturatrice'.
Odontologie, 1927, 65, 277-302. see p.279.
2. See sections 6.2.3 and 6.3.4.1.
3. Gion, -. Report of an address given to La Société de Chirurgie (Paris) on 22nd February 1865. Gaz.Hôp. (Paris), 1865, 38, 119. See also Bull.Soc.Chirurgie Paris, 1866, 2nd.ser.,6, 61-63.
4. Gaujot, G. and Spillman, E. Arsenal de la chirurgie contemporaine:(Paris, 1872), 2vols., II, 37.
5. Suersen, W. 'The restoration of a distinct utterance by means of a new system of artificial palates, to be employed in cases of congenital and acquired defects of the palatine organs'. Brit.J.dent.Sci., 1867, 10, 339-342.
6. Kingsley, N.W. 'Obturators, ancient and modern'.
Johnstons dent. Misc., 1877, 4, 441-447. See pps.441 & 445-446.
7. Ottolengui, R. Discussion on Dr. Bishop's paper.
Internat. dent.J., 1893, 14, 429-431.
8. Suersen, W. 'A new system of artificial palates'. Amer. J. dent. Sci., 1867-68, 3rd.ser.,1, 373-379.
9. Coles, J.O. 'Remarks on a lecture by Dr. Wilhelm Suersen'. Brit.J.dent.Sci., 1867, 10, 446-449.
10. Ramsay, R. 'The treatment of congenital cleft palate'. Brit.J.dent.Sci., 1865, 8, 85-86, 88-89. See also Trans. odont.Soc., 1863-65, 1st.ser.,4, 274-293.
11. Suersen, W. 'Artificial palates'. Brit.J.dent.Sci., 1869, 12, 36-38. See also Amer.J.dent.Sci., 1868-69, 3rd. ser., 2, 1-9.

12. Weber, T. 'The construction of Suersen's obturators'.
Indep. Pract., 1885, 6, 188-190, 243-245, 290-296.
13. Gibson, K.C. 'Oral deformities and their correction'.
Internat. dent. J. 1890, 385-403.
14. Bishop, J.B. 'Hard rubber obturators'. Dent. Rec. 1893,
13, 317-318.
15. Bishop, J.B. 'Experiences in treatment of cleft palate'.
Internat. dent. J. 1893, 14, 406-413, 426-427.
16. See section 1.13.
17. Suersen, W. 'Ueber Gaumendefecte'. In Baume, R. Lehrbuch
der Zahnheilkunde 2nd. ed. (Leipzig, 1885), 726-745.
18. Sauerbier, A. 'Ueber die Anfertigung eines obturators
mit Resonanzboden als Ersatz eines erworbenen Gaumen
defects'. Zahnärztl., 1867, 22, 231-235.
19. Debout, -. 'On the restoration of congenital fissure...'
Dublin Quart. J. med. Sci., 1862, 490-512.
20. Dorrance, G.M. The operative story of cleft palate
(Philadelphia & London, 1933), p. 369.
21. Warnekros, L. 'Demonstration über Obturatoren und ihre
Anwendung bei angeborenen Gaumenspalte'. Verh. dtsch.
odontol. Ges., 1895, 7, 145-152.
22. Gruner, O. 'Ueber Obturatoren' in Scheff, J. Handbuch
der Zahnheilkunde (Vienna, 1904), 3 vols., III, 405-410.
23. Stoppany, G.A. 'Cleft palates and obturators'. Dent.
Rev., 1909, 23, 1035-1039.
24. Warnekros, L. 'Cleft Palate'. Quart. Circ., 1909, -,
193-241. See page 222. Translated from 'Die Entstehung
der Hasenscharte des Wolfsrachs und der hintern
Gaumenspalte. Korresp.-Bl. Zahnärzte, 1899, 28, 348-360.

25. Stoppany, G.A. Report of a paper. Schweiz. Vjschr. Zahnheilk., 1908, 18, 156-157.
26. Stoppany, G.A. Report of a paper. Schweiz. Vjschr. Zahnheilk., 1905, 15, 350-353.
27. Gunning, T.B. 'Hard rubber appliances for congenital cleft palate'. Amer. J. dent. Sci., 1878-79, 3rd. ser., 12, 289-298. See also Johnstons' dent. Misc., 1878, 5, 328-335.
28. Grunert (n.22), p.407.
29. Grunert (n.22), p.421.
30. Bruck, J. Die angeborenen und erworbenen Defekte des Gesichtes, der Kiefer, des harten und weichen Gaumens.. ... (Breslau, 1870), 8-20 and plate 5.
31. Baker, H.A., 'An appliance for congenital cleft palate'. Dent. Cosmos, 1881, 23, 179-186.
32. Baker, H.A. 'An improved appliance in the physiological treatment of cleft palate'. Brit. J. dent. Sci., 1884, 27, 847-848.
33. Baker, H.A. in Litch, W.E. American system of dentistry (Edinburgh, 1887), 3 vols., II, 1053-1100.
34. Hahn, G. 'Ueber obturatoren'. Korresp.-Bl. Zahnärzte 1894, 23, 312-316.
35. A copy of Brügger's text, Behandlung der Gaumenspalte mit besonderer Berücksichtigung der Prothesen mit Korkkern (Basle & Leipzig, 1895), was not available for consultation. His hinged design was referred to and illustrated in the following:

Preiswerk, G. Zahnärztliche Technik (München, 1906), p.397.

35. Brügger's text,
Grunert (n.22), p.420.
Ruppe and Ruppe (n.1), p.281.
36. Grunert (n.22), p.422.
37. Watt,D.M. 'Cleft palate in edentulous patients'. Brit.
dent.J. 1957,102,253-267.
38. Case,C.S. Comments on a paper by Ames,W.B., Dent.Rev.
(Chicago), 1891,5,657 and 665.
39. Case,C.S. 'A method for producing the Kingsley cleft
palate velum'. Brit.J.dent.Sci., 1885,28; 701-704.
See also Dent.Cosmos, 1885,27, 385-393.
40. Case,C.S. 'Soft rubber palates for congenital clefts'.
Brit.J.dent.Sci., 1889,32,777-779. See also Dent.Rev.,
1889,3,412-416.
41. Case,C.S. Dental orthopedia and correction of cleft
palate 2nd.ed. (Chicago,1921), 409-470.
42. See section 6.2.6.
43. Ruppe and Ruppe (n.1), 283-287.
44. Riegner,-. 'Die Prothesenbehandlung der Gaumenspalte.
Bruns'. Beitr.klin.Chir., 1914,91,569-577. See pps.
572-573.
45. Brandt,L. 'A new obturator'. J.Brit.dent.Assoc.,1890,
11, 713-717. See also 'Obturators'. Dent.Rec.,1891,11,
18. Brandt's original text, Zur Uranoplastik,
Staphylorhaphie und Prothese (Berlin,1888), was not
available for consultation.
46. Illustrations of Brandt's design were given by Grunert
(n.22), p.415, also Ruppe and Ruppe (n.1), p.280.
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6.5 MEATUS OBTURATOR

6.5.1 Introduction

The meatus obturator was designed to a basically different premise than either the flap velum, artificial velum or bulb obturator. This premise affirmed that complete occlusion of the nasopharynx from the oropharynx was not necessary for good speech. The meatus obturator took its name from the vertical extension into the nasopharynx. The appliances, as designed by Fröschels and Schalit and discussed in the subsequent section, were extended to the opening of the superior nasal meatus to reduce the effective size of the nasal resonating chamber. A second feature of the meatus obturator was that it controlled the volume of air passing through the posterior nares.

The latter concept was not new. In 1850, Hullihen¹ had sought to provide a prosthesis for a patient with an acquired palatal defect which performed exactly this function. Figure 91 illustrates aspects of Hullihen's design. The two metal hemispheres were fitted to the posterior nares and were mounted on a slide. By movement of this slide antero-posteriorly, so the passage of air could be controlled. A few years later, in 1855, Blandy² attempted an improvement by replacing the hemispheres with two spring governed valve flaps (figure 92).

Foucou (1910)³ presented a patient for whom the nasopharynx had been partially occluded by a mushroom-like body attached to a palatine plate. Simon (1864)⁴ suggested the

use of small rubber balloons to occlude the nasopharynx, following the repair of the hard palate by uranoplasty. However, there were no serious essays in the field of the meatus obturator until the work of Froschels and Schalit.

6.5.2 The Derivation of the Meatus Obturator

In 1946, Schalit⁵ wrote an account of the meatus obturator and its relationship to the artificial velum, rigid (bulb) obturator and combined surgico-prosthetic methods of treating soft palate defects. Schalit recalled the naissance of the meatus obturator which arose from the work of his associate Froschels, a speech therapist. The account was well referenced to the work which Froschels and Schalit had published individually in the late 1920's^{6,7,8}. A combined paper from this period by the two authors was also traced⁹.

Froschels believed that, in instances of cleft palate, certain resonators came into use which were not noticeable in 'normal' speech. These resonators included the cupola of the nasal cavity, the superior nasal meatus, and the opening of the Eustachian tube. By blocking these resonators with cotton wool soaked in paraffin, Froschels was able to reduce the rhinolalia aperta: he had recognised this as the speech defect associated with cleft palate.

Schalit devised the obturator which performed the same function as the experimental cotton wool. It stood vertically, 1-1½ cm from the posterior pharyngeal wall and was mounted on a conventional base (see figure 93). The obturator was fashioned in gutta percha which initially

completely occluded the posterior nares to produce total rhinolalia clausa. The positioning of the gutta percha model was controlled with the aid of posterior rhinoscopy. A hole was made in the obturator to permit air flow and was adjusted in size until the correct balance was obtained between rhinolalia clausa and rhinolalia aperta. When a satisfactory model of the obturator had been produced in gutta percha, it was duplicated in hard vulcanite for the patient's use (see figures 94 and 95).

6.5.3 Application of the Meatus Obturator

Fröschels and Schalit felt that their device was applicable to all cases, except those with narrow clefts and long soft palate remnants. In such instances, insertion would be a problem. The qualities which the meatus obturator conferred from the phonetic point of view were widely appreciated amongst speech pathologists. By far the most cogent section of Segre's account of palatal prosthesis was that dealing with the meatus obturator¹⁰. Segre was a speech pathologist whose history of the palatal prosthesis was marred by inexactitude and a lack of sympathy for the problems facing the dentist¹¹. He had a first hand knowledge of the meatus obturator, however.

Apart from his own work in association with Mela, Segre also referred to Meder, Reichenbach, Nadolenczny, Weiss, Fischer and Schubert as writers with experience in the use of the meatus obturator. Of this group, Reichenbach stands out as an ardent protagonist. Not only did he write of the meatus obturator in general terms¹², but he also conducted

an experimental investigation into the results obtainable by use of the meatus obturator in comparison with other types¹³. His conclusion in this investigation was that only the meatus obturator was capable of relieving rhinolalia aperta without the necessity of phonetic exercise by the patient. Reichenbach continued to write of obturators, including the meatus variety, until recent times; he contributed the chapter on this subject in Haupt, Meyer and Schuchardt's text (1959)¹⁴.

Apart from one American disciple, the meatus obturator had an entirely teutonic following. Sharry¹⁵ wrote of his experience with the meatus obturator in 1954. Although a distinguished prosthodontist he was not, in this instance, a particularly informed student of his topic. He wrote that the meatus obturator was first described by Schalit in 1946 (the date of his only appearance in the American literature) and that his concept had not received the attention which it undoubtedly deserved. Whatever his errors regarding the previous literature, Sharry was correct in gauging the impact which this prosthesis had had on any literature other than the German. Sharry remained faithful to the concept of the meatus obturator, publishing further commentary in 1958¹⁶ and 1973¹⁷.

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CHAPTER 7
COMBINED PROSTHETIC AND SURGICAL
PROCEDURES

7 COMBINED SURGICAL AND PROSTHETIC PROCEDURES

7.1 Introduction

The condition of congenital cleft palate represents more than the failure of two embryonic processes to fuse ; there is also an absolute deficiency of tissue. Modern techniques of plastic surgery allow the transposition of oral tissues to the site of the defect and methods of compensating for the missing tissue have been devised. Before these advances, there were those surgeons who recognised the problem of tissue deficiency and the limitations of current surgical technique. They sought a strong and reliable repair using the tissue available and filled the remaining defect with a prosthesis.

The combined procedures may be grouped into three categories. .

- i. Surgical repair of the anterior palate
with an obturator posteriorly
- ii. Surgical repair of the palate posteriorly
with an obturator anteriorly
- iii. "Surgical engineering" with use of a
prosthesis

"Stimulator" appliances may be mentioned also, but these were not strictly prostheses and will not be discussed in detail. Stoppany's view that the Suersen type of obturator bulb encouraged muscular hypertrophy was a widely held opinion amongst protagonists of this style of prosthesis^{1,2}. It could thus be considered as a suitable appliance to use prior to surgery, as the tissue deficiency

might be reduced thereby.

Ruppe and Ruppe mentioned five writers who had designed stimulator appliances for use after surgical repairs. These appliances were not employed to close a residual defect but to massage the repaired soft palate, encouraging muscular development and restored function. The Ruppe's claimed that Krouschoff, in a work entitled "Traitement des fissures et des perforations du palais par une nouvelle méthode" (St.Petersberg,1885), was the first to suggest a specific form of stimulator appliance. A French edition of this work could not be traced, but the National Central Library⁴ confirmed the existence of a ii+39 page book by Krouschoff, in Russian. A copy is held by the National Library of Medicine in Washington. Mazahari⁵ spoke enthusiastically of the palatal stimulator appliance at the 2nd.International Conference on Cleft Palate (Copenhagen 1973). He inferred that it was a recent development, but this is manifestly not the case.

7.2 Surgical Repair with an Obturator Placed Posteriorly

The surgical techniques were aimed at achieving total repair of hard and soft palate. However, if such repair was to be achieved without tension at the suture line, the soft palate must remain too short to contact the posterior pharyngeal wall. Consequently, pharyngeal obturators of various designs were introduced posterior to the repaired velum to make good this deficiency.

7.2.1 Wolff and Schiltsky

Julius Wolff was a successful surgeon in Berlin with

a particular interest in cleft palate surgery : Schiltsky was a dentist of the same city.

An article by Wolff⁶ published in 1880 was accompanied by an engraving of the obturator he used to correct post-surgical velar insufficiency (see figure 96). Schiltsky⁷ in a booklet of 1881 published details of a similar prosthesis (see figure 97).

The relationship between Wolff and Schiltsky's work was indicated by the following footnote in a later paper by Wolff⁸.

"My pharyngeal obturator is often called the Schiltsky palate obturator. This is however incorrect; on the one hand the name palate obturator would provide an entirely inaccurate idea of the significance of the prosthetic appliance placed between the velum and the rear wall of the pharynx. On the other hand Herr Schiltsky, who has resumed the efforts made by Herr Suersen at my suggestion using my patients, is not in any way involved in my idea of the pharynx obturator. Moreover, it remains Herr Schiltsky's merit, which I shall always emphasise with pleasure, to have put my idea into practice by extremely careful technical work and choice of materials".

Ernst⁹ subsequently confirmed that the idea of the pharyngeal obturator had been Wolff's and that Schiltsky had been called upon to fabricate the appliances. In its original form, the obturator was a hollow box or resonance chamber of hard vulcanite : it was rigidly attached by an inflexible stem to a base covering the hard palate. As indicated by Wolff's footnote, quoted above, the obturators

were made by the Suersen method, i.e. from a gutta percha model moulded in the mouth by muscle activity.

Schiltsky advanced the design of the pharyngeal obturator from the original rigid structure. To allow for the movement of the surgically reconstructed velum, the obturator was attached to the palatal base by a helical gold wire spring whose flexibility was controlled by a chain within the coil. Schiltsky also preferred a soft rubber bulb for the obturator, claiming that it increased muscular exercise of the soft palate. Standard texts which gave descriptions of the method of making Schiltsky's obturators included those of Scheff¹⁰ and Preiswerk¹¹.

7.2.2 Modification of the Schiltsky Obturator

Modifications were suggested to both the connector and the bulb.

Grunert¹² felt that the connector of Schiltsky's design was too flexible and recommended that it should either be made from two coils of wire (one wound left to right, the other right to left) or a coiled band. He gave two references to his earlier work concerning the latter suggestion. Grunert favoured the soft rubber bulb and retained this for his own patients. He devised a tongue and groove joint so that the connector and bulb could be removed from the vulcanite base. This preserved the base from two vulcanisation processes and subsequent weakening.

Riegner¹³ preferred a hard rubber bulb for reasons of durability, but was satisfied with a coiled wire connector containing a further wire for strength. He noted, however,

that Warnekros favoured a hard rubber bulb together with a simple half round gold wire as the connector.

The Swiss surgeon, Kappeler¹⁴, employed Brügger's modification of the bulb (figure 98). This, like his appliance for unoperated clefts (figure 84) was made of cork impregnated with vulcanite¹⁵.

Brandt¹⁶, who favoured the inflatable bulb obturator (figure 88) made a modified design suitable for post-operative cases (figure 99). This idea seemed closely aligned to Simons notion of occluding the nasopharynx with a small balloon¹⁷.

There is evidence that neither Wolff nor Kappeler regarded the pharyngeal obturators as permanent features of the patient's treatment. Kappeler concluded in a paper given in 1889 that systematic speech training might obviate the use of an obturator in some cases. Wolff, contributing to the subsequent discussion, welcomed this line of thought¹⁴.


Warnekros, an inveterate modifier of others' work¹⁸ recommended a rigid form of Schiltsky's design¹⁹ (figure 100). This merely represented a return to Wolff's original concept, but Warnekros suggested that the size of the bulb should be gradually reduced as speech improved.

7.3 Surgical Repair with an Obturator Placed Anteriorly

The object behind both techniques to be described in this section, was to repair the soft palate and maintain it in a position sufficiently far posterior in the pharynx for a soft tissue nasopharyngeal seal to be achieved during

speech and swallowing. Such procedures left insufficient tissue for total repair of both hard and soft palates. A specially designed obturator was thus placed anterior to the repair to make good the residual defect.

7.3.1 Passavant's Stud

Dorrance²⁰ traced Passavant's attempts to obtain velopharyngeal competence by palatal flap advancement and pharyngo-plasty. Passavant had devised these procedures between 1862 and 1878, but all had failed to provide lasting results. Accordingly, Passavant made a full thickness, transverse incision through the mid portion of the repaired velum. The lengthening derived from this relieving incision was sustained by the insertion of a stud like obturator to maintain the patency. Kuester²¹ subsequently illustrated the obturator thus : 

Dorrance²² dismissed Passavant's innovation as "impracticable".

"The obturator cannot be applied until an incision is made into the velum. The presence of such a contrivance in the palate unquestionably interferes with the function of the velum, and the application of an incision undoubtedly severs some of the muscle fibres essential for a functional velum".

7.3.2 Harold Gillies and Kelsey Fry

Gillies was the surgeon of this Guy's Hospital team and Fry the dentist. The rationale for their combined surgical and prosthetic treatment was reasoned by Gillies as follows²³.

Where a congenital palatal defect involved hard and

soft palates and remained unoperated, there was normal occlusion of the non-involved teeth. The patient's health did not appear to be impaired by the presence of an unoperated cleft. However, nearly all those patients who had undergone surgical closure of the hard palate exhibited a deformed occlusion and narrowing of the face and nasal passages. Their intonation was also markedly nasal and whether or not they had submitted to surgery, it was usually necessary for the patient to wear a dental prosthesis of some form.

With these considerations in mind, Gillies recommended suture of the soft palate as far posteriorly as possible into the pharynx. This necessitated detachment of tissue from the hard palate and increasing the size of the hard palate defect. The residual defect could be closed by a prosthesis.

Fry^{23,24,25} described four prosthetic appliances. The first was a simple plate to aid feeding by the infant prior to operation; whilst the second appliance was designed to hold the epithelial inlay in position at the time of operation. The third appliance was more intricate: its function was to maintain the restored soft palate in its new position during healing, i.e., pushed back to contact the posterior pharyngeal wall (see figure 101).

Post-operatively, the patient was provided with a simple palatal cover which extended into the defect to maintain the soft palate in position.

7.4 "Surgical Engineering"

Pickerill adopted a unique procedure which he

practised for a number of years. In 1912²⁶, he reviewed the deficiencies of the various surgical procedures for closure of combined hard and soft palatal defects. Langenbeck's operation was suitable for infancy, but could only be successful in a relatively narrow upper arch. Brophy's operation was severe and produced a very poor occlusion, whilst Lane's operation gave adequate free tissue but was accompanied by a high mortality rate.

Pickerill united the two remnants of the soft palate transversely across the defect to produce a muscular bar. The prosthesis which he then made (see figures 102 and 103) was of hard vulcanite, with a flap velum attached by a platinum hinge to the denture base. The feature of the prosthesis was the hook carried on the superior aspect of the hinged flap. The hook engaged the muscular bar and the flap velum was thereby raised to contact the posterior pharyngeal wall during speech and swallowing.

Pickerill presented a number of papers explaining his views. One such presentation was to the International Dental Congress of 1914²⁷. Reference to a more general article on the scope of Pickerill's plastic surgery practice (1928)²⁸ revealed that he had remained faithful to his convictions on the treatment of cleft palate after a further fourteen years.

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CONCLUSION

CONCLUSION

This presentation may be considered remarkable for its exclusions rather than its inclusions. For example, generous mention was made of the rôle of venereal disease in producing palatal defects, but such instances are now rare: palatal prostheses are more commonly made to-day for patients who have an acquired defect as a result of a surgically treated neoplastic condition, yet these appliances received scant attention.

To justify the approach, one must review the aims of the thesis. These were to present, in some detail, an analysis of the earlier and least accessible literature and to demonstrate the foundation of various principles in the field of palatal prosthesis. As a corollary to the second aim, some allusions were made to early principles still to be found in modern prostheses.

The literature has expanded greatly since the closing years of the last century. As surgery progressed, so the prosthetic treatment of the congenital cleft palate declined in importance and prostheses for surgically acquired defects achieved greater prominence. Publications in the latter sphere probably reached a peak in the German literature of the late 1950's. For all this great surge in the volume of literature, there was very little which was totally new.

Aspects which represented departures from established thought and which arose this century have been discussed in this thesis. The meatus obturator (section 6.5) and the

Gillies/Fry procedures (section 7.3.2) may be quoted as examples. Such items apart, more recent literature was devoted to the application of new materials to established designs or improvements in clinical technique. Basic concepts and thought in prosthetic therapy remained unaffected.

A contributory factor in the relative neglect of more modern writing was the ease of tracing references. The increasing elaboration of cumulative indices and the scope of modern library facilities render the pursuit of twentieth century trends a straightforward matter. When these trends have little significant influence on a theme, pursuit for pursuit's sake would seem unnecessary.

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